MODEL AIRPLANE NEWS

April 1949 • 25 CENTS

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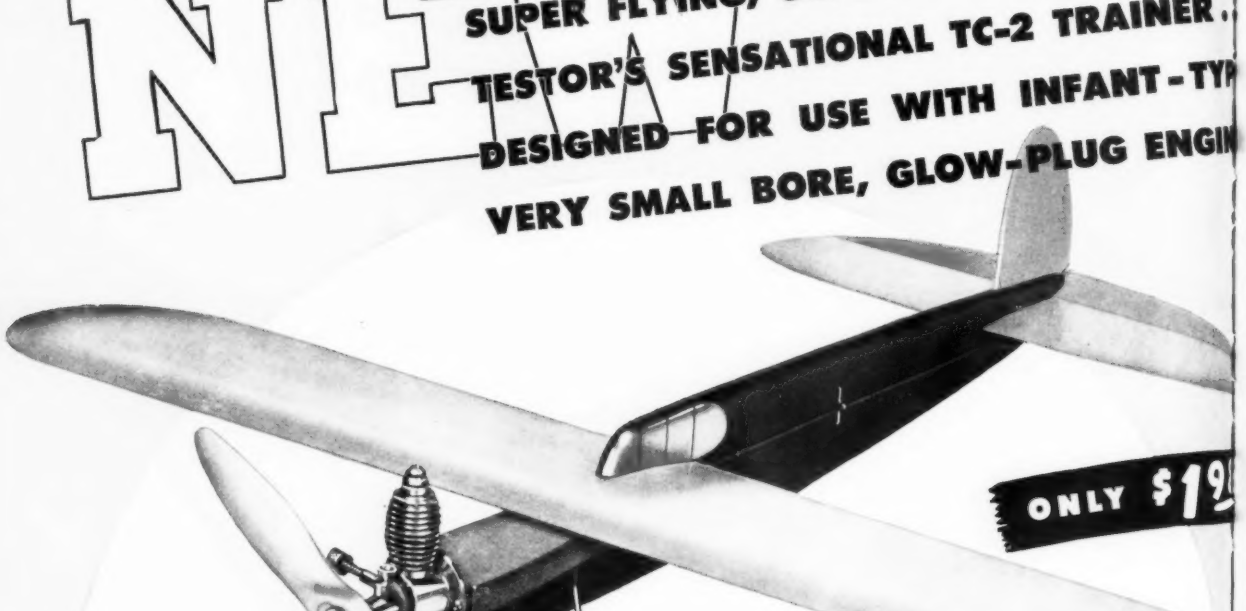

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Testor's BABY TC-2 is an accurately scaled-down version of Testor's popular TC-2 TRAINER. It has been carefully engineered to meet the requirements of the beginner, and serves the purpose of initiating the novice into the exciting Control Line model airplane hobby. The BABY TC-2 is designed for use with the new, inexpensive, very small bore, glow-plug type engines and is also suitable for use with carbon dioxide type engines. The wing span is 18" and the overall fuselage length is 16". All necessary parts, except the power plant and propeller, are furnished in the kit. Wooden parts are completely pre-fabricated, and hardware and wire parts are precision shaped and bent ready for use.

The advanced modeler will find the BABY TC-2 suitable for use with glow-plug type engines of .099 in. displacement. As the model flies much faster with this size engine, it is recommended that the novice use the smaller engines of approximately .020 cu. in. displacement until thoroughly familiar with the flight characteristics of the airplane.

The BABY TC-2 can be flown with conventional control lines *indoors!* Where space is limited, the airplane can be allowed to fly by itself with the controls locked in neutral position. This is accomplished by running a single wire from the wing to a heavy object located in the middle of the room.

Can be flown indoors!

TESTOR CHEMICAL COMPANY (WOODWORKING DIVISION) ROCKFORD, IL

SCRAP BOX by BILL WINTER

ALL these arguments about the dangers of unrestricted speed have been honored by a complete silence from the die-hard speed boys. The *Scrap Box* was coming to the point of view that either the proponents of the minimum wing and maximum engine just didn't care, or else were in complete agreement that fences should be erected or a new type of airplane developed for racing competition. Now we know!

Robert Schultz, Chicago, cut loose with a blast for straight speed which is good enough, and important enough, to run verbatim, with the single comment that this statement rounds up the picture. You now "pays your money and takes your choice."

"When the recent discussion on speed flying started, I was very much interested because I build and fly speed models," begins Schultz. "I agree with you when you say that the speed model is becoming amazingly fast, but when you say that either scale models should be flown (semi-scale, we said, Bob) or that speed models should be flown inside a fence, I cannot agree.

"As far as the flying of scale goes I don't think the ardent speed flier could work up much enthusiasm over flying a barge with gear, even though it is a scale model; the scale model belongs in the event created for it and not in speed.

"The idea of a fence doesn't sound too bad except for the fact that the cost of a fence would make it absolutely impossible. Most contests which I have attended usually have a hard time raising prize money let alone a couple of hundred for fencing. If the fence were constructed ten feet high as suggested, it would hardly stop the models which fly off the lines at a height above ten feet. It is suggested that the fence might be made from chicken wire to keep the cost down. This hardly would be enough to stop a C or D Class ship. I base this assertion upon the fact that at one of the contests held here in Chicago, a Class D model went right through the trunk of an automobile after breaking free.

"From my observations at contests there are several reasons for danger to bystanders: (1) the spectators are far too close to the flying circle; (2) the pull-test is not rigidly enforced; (3) the models are not inspected to make sure the two halves of the fuselage are fastened securely. I therefore believe that the whole situation could be cleared up if the contests were run more carefully."

Jim Walker and others who are working so hard on the fence idea may take strong exception to some of these points. We don't know. So *Scrap Box* wants to point out that it prints all viewpoints on all topics. Very frequently some manufacturer friend considers such comments to be the view of *Scrap Box* or of MODEL AIRPLANE NEWS; or that the axe is being thrown into some product, as in the case of engines that would suffer from limitations of the proposed team racing idea. All arguments get printed so that you can learn what the fellows are thinking and judge for yourself as to what has merit. One other thing: the episode of the model and the car trunk was not deleted for the simple reason that we wish to shock the rules-makers with the realization of what a hot speed job can do. Generally speaking, this kind of stuff is grist for somebody's mill, and so is left out of this column. It should be obvious that the solution to the problem, whatever it is, cannot wait on two seasons of gum-beating.

C. S. "Rushy" Rushbrooke, editor of the British *Aeromodeller*, sends us proof of the revised Wakefield rules, drawing attention to certain important changes. The most important one is the introduction of the 5-minute flight limit with a fly-off in case of tie. Some U.S. builders think this is aimed at the American single-flight school of thought where a half hour riser often provides the margin of victory. Actually, the new rule is long overdue, as is any rule in free flight or rubber that cuts down on luck and emphasizes consistency of model and flier. Another interesting change reads as follows: "An attempt of 5 seconds duration or under will constitute a 'no flight,' but only three such attempts for each round will be allowed. In the latter event the highest 'no flight' time shall constitute the recorded time for that round." As Rushbrooke points out, "It is obvious that a recorded time of just under 5 seconds in the case where a fellow gets three no-flights in a round, may make all the difference between winning or losing the event."

Eye witnesses have reported same fabulous things in talking about Jim Walker's new radio job. Jim recently told *Scrap Box* that his new job weighs 8 lbs. 6 oz., with a wingspan of 80 inches. Weight of radio, including batteries and servo is 22 oz. "The control is our pride and joy," says Jim, "since it gives very fast action of every needed control, including flaps and aileron."

Speaking of radio, we got into the act too this past January. After the last Nationals, a 6 ft. six square foot job was evolved along the line of a prettied up Cub. Walt Schroder spent four months sparetime building, so on New Year's Eve (of all times), the ship was dragged out of various closets for some winter flying. Neither of the "experts" knew a thing about radio so the project promised to be illuminating. What chance does the dub have in radio? How hard is it to fly a radio model? Must you know radio? Here is our experience.

Provided the airplane is inherently stable with decent turn characteristics, the greenhorn can fly satisfactorily on a rudder alone. On our third flight we did a figure eight and had no difficulty landing in any direction from wherever the motor cut out over the field. Despite advice that control should not be used at less than 50 ft. off the ground after launching, we were able to control right from the hand launch and down to the ground. Once, when Walt hit himself in the back of the head with the stab for a bad launch, we were able to pull the airplane out of a righthand diving turn before it hit the ground and complete a good flight. Although we had rudder area enough to stand the ship on its wingtip in a left turn right after launching, the ship was capable of holding altitude or achieving a slight climb with rudder jammed all the way left! Ordinarily, such an accident means a bundle of splinters.

Twice the rudder jammed, and twice the ship flew out of sight. We hate to admit this, but the reason for the jammed rudder was putting more rubber power than recommended on the Good Brothers' escapement. Failure of the pneumatic timer permitted the ship to get away twice. In no event should you contemplate flying radio

(*Turn to page 46*)

One of Jim Walker's radio controlled ships is started off. Herb Owbridge of *Rudevator* fame is the graceful launcher

MODEL AIRPLANE NEWS
JAY P. CLEVELAND
Publisher

Serving Aviation 20 Years

APRIL, 1949 VOL. XXXX—No. 4

CONTENTS

Cover Painting by Jo Kotula

OUR COVER painting this month depicts a beautiful scale model of the Fokker "Tripe," built by John Doyle of Andover, Mass.; it is his first controliner, and a very successful flier. This 1½" scale model is of standard built-up and paper covered construction and is so light that the *Super-Cyclone* engine produces a 45 mph speed at half revs. To ease the transportation problem, the model can be quickly dismantled by removing a few screws and bolts. A hand carved 14-6 black walnut prop is used. Mr. Doyle had so much success with this ship that he can't understand why more builders don't try producing accurate scale jobs to fly U-control.

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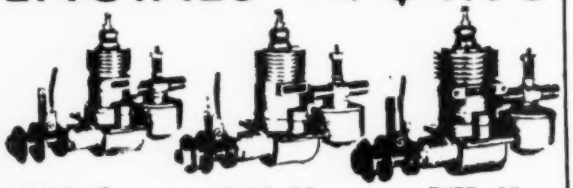

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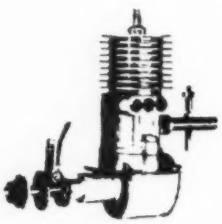

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REPORT FROM THE WEST

by "Tip" Hannon

Bert Gauny holds his Torpedo-powered Glory Bee

THIS was supposed to be the issue when we would talk about fuel. Let me tell you right here and now that I might just as well have gone to look for a left-handed spark-plug wrench. No, it wasn't quite that bad; but if you ever want to spend a couple of months really learning something—try learning fuels.

How little one knows, and I can vouch for that, is only brought out by speaking to the different men closely allied with the fuel end of modeling. Bill Sweet, a fellow who has an idea or two on fuels and engines (probably at least two ideas on the latter!) advised that I get in touch with Lew Mahieu. Further on in this column you'll read what Lew has to say. What about the others from out here in the West who should know something about fuels? We have our share of them, and to a man their sentiments were about the same as put forth by Lew.

It would be difficult, not to mention foolish, were we to go ahead and write about fuels in general. There are so many phases to fuels, so many different and diverse opinions to the question that we would probably do more to confuse than instruct.

It goes without saying that the engine manufacturers know best. They have gone to all sorts of trouble, experiments and expense to find out for you, the purchaser of their engines, just the right kind of fuel to use. Take a tip from the oldtimers—they say you can't go wrong if you stick to directions. What about the fuel manufacturer, what has he got to say? Purchase any fuel you want and you'll find instructions on its label also. Notice how they coincide with the instructions of the motor makers.

The modelling fraternity is much better off than are followers of some other hobbies. It has advanced in the last 25 years to a point where the prospective modeler doesn't have much to worry about. He has at his disposal the findings of many experienced people. We owe it to these people to adhere to their instructions; let's take advantage of this and profit by their experiments. Ask Lew Mahieu—read what he has to say. He's been in the "racket" for a time or two!

"West Coast Tips" is happy to welcome a few notations from Lew Mahieu. Lew will conduct this column for awhile and he will welcome comments, bouquets, brickbats, or what have you, in an aeromodeling way. Lew writes:

Inglewood modeler Jackie Butler took 2nd in a recent Sportsman Contest

by LEW MAHIEU

This month I will try to bring you up to date on the activities of some of the better known West Coast flyers—also, what is happening in some of the clubs.

I want to remind the West Coast juniors and seniors to get ready for those three big *Thermal Thumbers* Junior and Senior Contests. These contests are sponsored by Cal-Aero, and the first will be an Indoor event, followed by outdoor rubber, then hand launch and towline glider.

Jack Sauer launches Bob Hanford's 100" original glider. Ship captured 2 firsts, a second, third, and seventh out of six contests entered

The free flight "precision" or sport-type of contest is becoming very popular out here. I hear that the *Thermal Thumbers* have several more of these contests planned for this year.

The boys out here are really taking to that little bundle, the K&B *Infant*. The *Lakewood Model Club* of Long Beach has already held a free flight precision meet for small engines and it was a big success.

The *Los Angeles Aeromodelers* have made a change in their contest calendar for this year. In stead of the usual eight semi-annual meets, the *LAAM* will now feature five annual meets—free flight rubber April 3, free flight gas June 5, glider September 11, and U-control speed and precision November 13; all these meets are A.M.A. sanctioned.

The rumor is being passed around the West that Frank Cummings, the 1948 International Champ, is entering the manufacturing business. Frank will concentrate on supplies for the indoor builders.

Don Newberger is now attending Northrop Aeronautical Institute. Don told me that the *Northrop Club* is booming again, and they have planned several club meets for '49.

A question that has been asked lately is,

What's Marvin Irwin doing? Well, Marv is now hobbying with photography——yep, complete dark room and all.

At this point I might tell you that speed flyer Troy Burris is back in Uncle Sam's Air Force. Capt. Burris is now flying the Airlift in Germany!

From April 26 to May 1 a large Hobby Show will be held at the Shrine Auditorium Convention Hall in Los Angeles. Exhibits will include radio, television, model railroads, planes, and tools, just to mention a few. Demonstrations are also planned. We understand that Jim Walker will be down to demonstrate his latest innovation. This is the first hobby show of this kind in the Los Angeles area and should be very interesting. Hope to see you there.

I have been asked by Tip Hannon to write a few words about model engine fuels. As the beginner would say, "What fuel should I use?" Most engine manufacturers usually print on the instruction sheet the types and brands of fuel they have tested and they know will operate the engine best. As for those who mix their own fuel and who know nothing about it, I discourage the idea. I do not recommend it for several reasons. First, if the right lubricants are not used, or if the fuel is not properly mixed, you are likely to find your engine pretty sad on compression after a run or two. Another reason is that the chemical ingredients used are highly inflammable, especially nitro-compounds (though they are not as dangerous after they are in desensitized form). The main reason, however, is that fuel manufacturers know the right materials to blend to give you maximum performance and the least wear on your engine. Some fuel manufacturers have gone to the trouble of mixing special fuel for different types of engines, that is for ringed and lapped engines. Others have spent considerable time developing fuels for different weather conditions, a point which is really important to the speed flyers. All in all, fellows, there are a lot of fine fuels at your hobby dealer's to choose from, whether it's for freeflight, stunt, speed, glow plug or ignition.

We all know that the eyes of the nation's hobbyists are turned toward the West. Yes, the West Coast has many fine modelers and manufacturers. So in the future I will devote a large portion of this column to bringing you a short story on their activities. Next month I will give you a biography of that well liked and well known West Coast boy, the 1948 National Champion——Bob Holland.

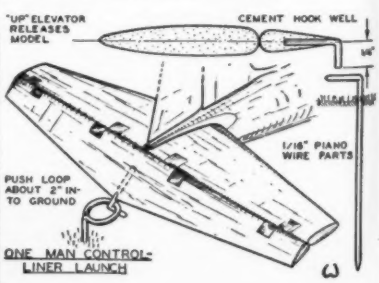
EXTRA!!

Those famous radio control experts, Walt and Bill Good, have designed a new ship especially for R. C. flying. It's an attractive tricycle gear job with 6' span and a .30 engine. If you've been in doubt as to what kind of a plane to build for R. C.—this is IT! See May Model Airplane News.

U-CONTROL LAUNCHER

by I. A. Minor

HERE is a simple way to launch controline models without a helper. The 1/16" wire extends ¼" down from the elevator. The wire loop is pushed into the ground about 2". When up-elevator is given, the plane will move off unassisted.



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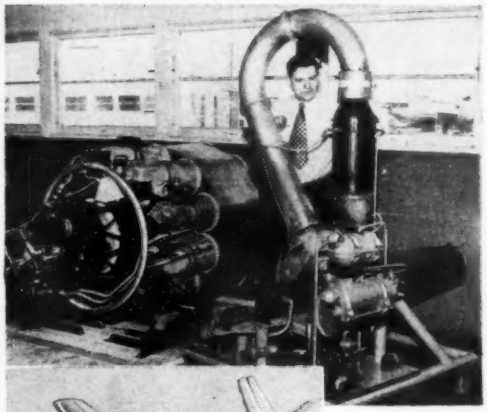

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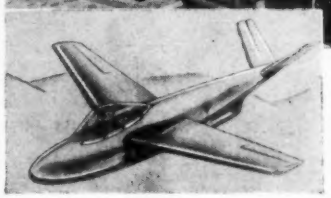

CAL-AERO STUDENTS DESIGN MIDGET JET

Forerunner of possible future jet powered personal planes is a single-place jet airplane and 240-lb. thrust jet engine now being developed and built in Cal-Aero's Engineering School. The lower sketch shows the design study of the plane. The upper photo shows its tiny jet engine alongside a "big brother"—a GE J-33 turbo jet. This actual developmental project is only a part of our modern streamlined training program that prepares "Cal-Aero" graduates to step directly into the best-paying jobs.

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N-4

AIR FORCE is buying more Convair B-36 bombers! That's the news of the month (and perhaps of the whole year) for it signals a sharp turn in USAF thinking away from the jet bomber and back to the long range piston-engine bomber. For to obtain the money to buy the additional B-36 bombers, AF had to cancel 30 Northrop RB-49 eight jet Flying Wing bombers, 51 North American B-45 four jet bombers, 118 North American F-93A jet fighters, 30 Northrop C-125 *Raider* assault transports and 10 Kellett H-10 helicopters. By thus cancelling orders for 239 airplanes worth $300,000,000 the AF has enough money to purchase 39 Convair B-36's! This is a graphic indication of the terrific cost of strategic airpower!

SURPRISE MOVE caught the industry flatfooted for AF had first come close to cancelling the entire order for 100 Convair B-36's, cut it to 95, threatened to cut it back to 50, stated at last it would not be cut below 95 except as rising costs dictated, i.e. as cost of bombers went up bombers would be clipped from the order so that the total committment remained the same. Suddenly, USAF orders an additional quantity! Washington buzzed with rumors as to why this action was taken, but in substance it simply signals a strong swing of USAF to strategic airpower. B-36 is the only bomber in the world capable of flying 10,000 miles with a substantial (10,000 lb.) bomb load. Despite any of its shortcomings it is the longest range aircraft now available, and if a global war is to be fought anytime in the near future (5 years), then it's the B-36 that will fight it.

THE OTHER AIRCRAFT cancelled actually may be only delayed another year since few, if any, of them would have been delivered before 1950 anyway. The North American F-93A is an improved F-86A swept-wing fighter and a prototype F-93A will be built and tested just the same. Northrop is converting 10 B-35 Flying Wing bombers to jet engines, giving USAF the equivalent of the RB-49 for service tests. USAF already has 139 B-45s on order so that the cancellation of 51 will not affect this production until next year, when the order may be restored.

ACTUALLY THE $300 million is made up of $200 million for the new Convair B-36 bombers and $100 million for modifications and "improvements" in existing B-36 and B-50 bombers. Insiders know this means flight refuelling equipment, which enabled a B-50 to fly 9400 miles without stopping last fall. By converting the monster B-36 to a flying tanker and using it to refuel the B-50, America would assuredly have a powerful long range striking force. AF will also install four Allison J-35 turbojet engines on a B-36 to test the advantages of jet power for takeoff and high speed acceleration. The engines will be slung in pairs in suspended nacelles under the wing, similar to the Boeing XB-47 installation. Naturally these engines will cut into the range of the huge bombers, but they will be operated only for brief periods and will be jettisonable if required.

NAVY HAS DONE SOME contract cutting of its own to line up its procurement with its strategic and tactical planning. Navy has cut the Vought F6U *Pirate* and transferred the money to continuation in production of the trusty Vought F4U-5 *Corsair*. Navy is still not sold completely on jet power, except for fast-climbing interceptors in the combat air patrol over the carrier, and prefers the reciprocating engine for shore strikes from the carrier. Navy also slashed out the Martin AM-1 *Mauler* and specified the Wright R-3350 compound engine for the new Douglas AD-4 *Sky Raider* attack plane. Navy ordered two Lockheed *Constellations* but not for the prosaic duty of passenger flying. Instead these two giant aircraft will be loaded with special radar and electronic gear for early warning and anti-submarine warfare duties. Navy also ordered three other specially equipped seasearch planes but won't tell what they are.

BILL ODOM will try it again! Although his "failure" to fly nonstop from Honolulu to New York resulted in a new international lightplane distance record, Odom will again try to fly the Beech *Bonanza* over the 5010 mile distance originally projected. He encountered thunderstorms and headwinds throughout his first attempt and finally gave up near Reno, Nev., to turn around and land at Oakland, Calif., 2406.9 miles from his Honolulu takeoff point. He remained in the air 22 hrs. 5 min. on the flight, which is an awful long time to keep awake! But Odom is known for sleeplessness, having circumnavigated the globe in a Douglas A-26 with Milton Reynolds, who does very little flying.

UNLESS A 20TH CENTURY Paul Revere comes along, U. S. airpower is going to be about scuttled this spring. President Truman has come up with a fiscal 1950 budget that slashes a healthy chunk out of USAF and Naval Aviation procurement; this at a time when "phase II" of the 70-Group program (calling for more procurement each year for five years) is scheduled. The airpower problem is simply this: Secretary of

Unusual British amphibian has pivoting wing; wings also fold for carrier storage. Known as Vickers-Armstrong *Seagull*, the amphibian is powered by Rolls-Royce *Griffon* engine driving counter-rotating props

Defense Forrestal is placating his three secretaries in the only way he knows how: divide the pie in three equal parts! While this keeps peace in the National Defense house, it completely ignores the international situation, strategic planning and inter-service tactical missions. The new budget will allow USAF to buy 1669 airplanes (compared to 2632 this year) and the Navy to buy 1000 airplanes (compared to 1233 this year). These recommendations are in direct contrast to those made by such groups as the President's (own) Air Policy Commission, Congressional Aviation Policy Board, Air Coordinating Committee, Stanford University report, etc. Thus Truman has ignored the very best aviation brains in our entire nation and recommended slashing aircraft procurement funds to a point supporting only 48 combat groups!

THE BELL X-1 supersonic speedster was originally designed to take off under its own power, but after construction began engineers decided to take it aloft to 35-40,000 ft. in a Boeing B-29, thereby saving the entire fuel load of the X-1 for flight upwards from this altitude at supersonic speed. Recently Capt. Charles Yeager proved that "it could be done" by firing the X-1 from a standing start at Muroc AF Base. The sleek rocket-powered research plane shot across the desert for 2300 ft. and then roared almost straight up, climbing 13,000 *feet per minute!* Although it attained this terrific rate-of-climb (compared to about 6000 ft. per min. for the best jet fighters), it burned out its fuel supply in just two minutes at about 25,000 ft. and coasted down to a landing. While the test was to determine the feasibility of rocket-powered interceptors taking off from the ground, it proved that such future aircraft (Convair XF-92, Republic XF-91, Lockheed XF-90) will have to have much greater fuel capacity if they are to get up to 40,000 ft. in a few minutes and then fight at that altitude for any length of time.

FEW AVIATION FANS have sat in the stands during the lightplane racing events, either at the Cleveland National Air Races or the All-American Air Maneuvers, Miami, without wishfully thinking it might be nice to own one of the tiny single-seat racers for his own use. Well, Dave Long, who designed and built "No. 67"—a trim all metal racer that competed in both events—has announced plans to place the plane in production. Dubbed the *Midget Mustang*, the plane is to be built by Schweizer Aircraft Corp., famed glider manufacturers of Elmira, N.Y. and will sell for less than $5000. (While this sounds like a lot of money, have you priced your favorite high-performance lightplane lately?) The plane has a span of 18 ft. 6 in. and 16 ft. length. It is powered by a Continental 85 hp engine and has a top speed of 200 mph! It meets the Goodyear and Continental Trophy requirements in every detail, including the rigid safety requirements. Long, ex-AAF pilot, has flown the prototype *Midget Mustang* cross-country many times and finds it comfortable, safe and plenty fast.

THOSE BIG BOEING *Stratocruisers* may be ships with no place to go, at least in the busy New York area, unless something is done quickly. Pan American, American Overseas and Northwest are all beginning to take deliveries on their *Stratocruisers* but New York's fabulous Idlewild Airport is the only one in the area with runways strong enough to support the 70-ton monsters. But the Port of N.Y. Authority won't permit the airlines to use the new airport unless they pay higher rates than their original leases called for—which the airlines refuse to do. The airlines offer to deposit the extra money against a future court decision if the Authority will just let them use Idlewild for their *Stratocruisers*. All the big obstacles to aviation progress aren't in aircraft design anymore!

EVERYBODY WANTS to get onto the trainer "gravy-train" it appears, since the AF decided it had better have some "old time" slow trainers, too, in addition to the "hot" North American T-28 design ordered. First came the Beech Model 45 *Mentor*, a two seat tandem version of the *Bonanza*

(*Turn to page 55*)

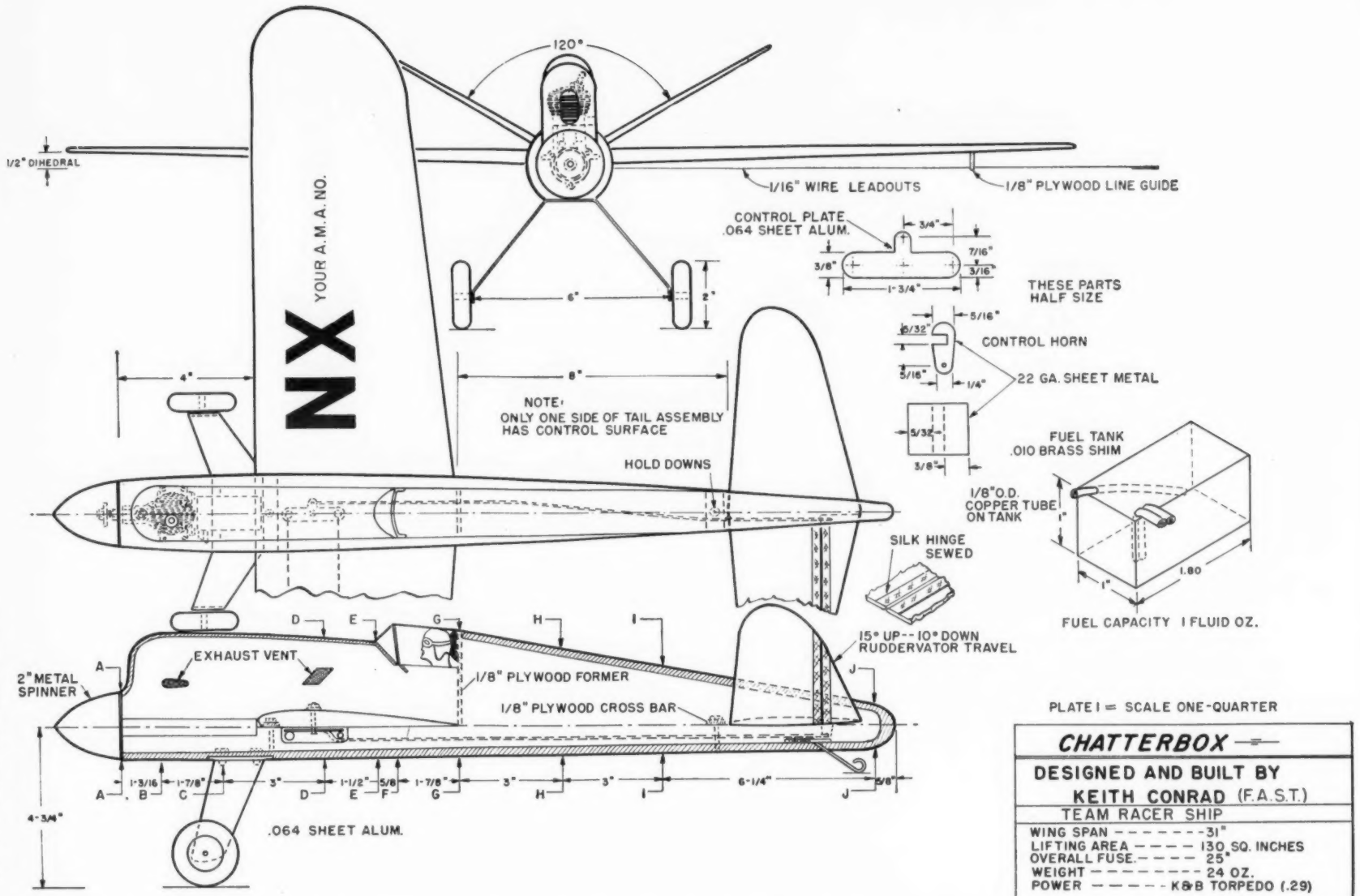


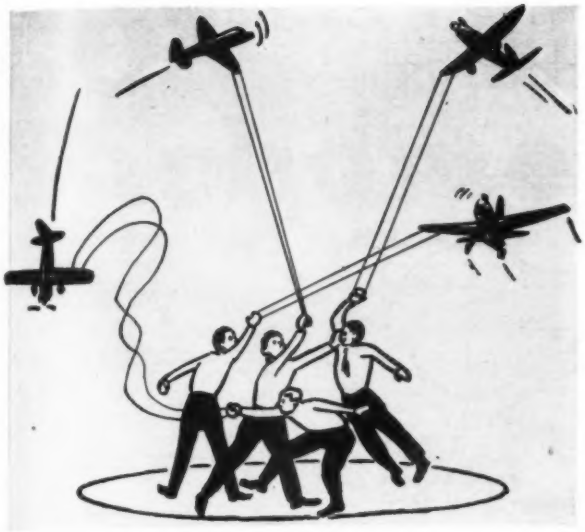
PLATE I = SCALE ONE-QUARTER

CHATTERBOX

DESIGNED AND BUILT BY
KEITH CONRAD (F.A.S.T.)

TEAM RACER SHIP

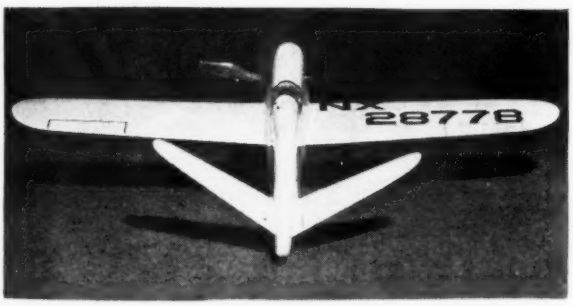
WING SPAN	31"
LIFTING AREA	130 SQ. INCHES
OVERALL FUSE.	25"
WEIGHT	24 OZ.
POWER	K&B TORPEDO (.29)



Team Racing

Team racing provides great sport for fliers, spectators, and ground crew alike. Try it in your club

by Keith Conrad



THERE'S a new day dawning in model aviation—a new type of sport and model are being developed. Although the new model speed cannot match those speeds flown by the screamin' broomsticks, in appearance it leaves its forefather in the dust.

Can you imagine flying a U-control ship resembling a Goodyear type racer, and competing in regular Air Race events? First you have preliminary-heat races, followed by 5 and maybe 10 mile races with pit stops and thrills for all. This idea has been thought of many times but nothing was ever worked out on it.

The *F.A.S.T.* club, seeing the handwriting on the wall (rising speed and more safety problems), started work but did not stop there. After much discussion we decided on the kind of ship we wanted for such an event. First we limited motor displacement to .299 cu. in., and plane size to a minimum of 125 sq. in. of effective wing area; this was to be topped off with a completely cowled engine, and a cabin or cockpit. Fuel load is 1 oz. maximum and fixed landing gear is mandatory. For further attraction we add a dummy pilot and decorate the ship in the gaudiest of color schemes.

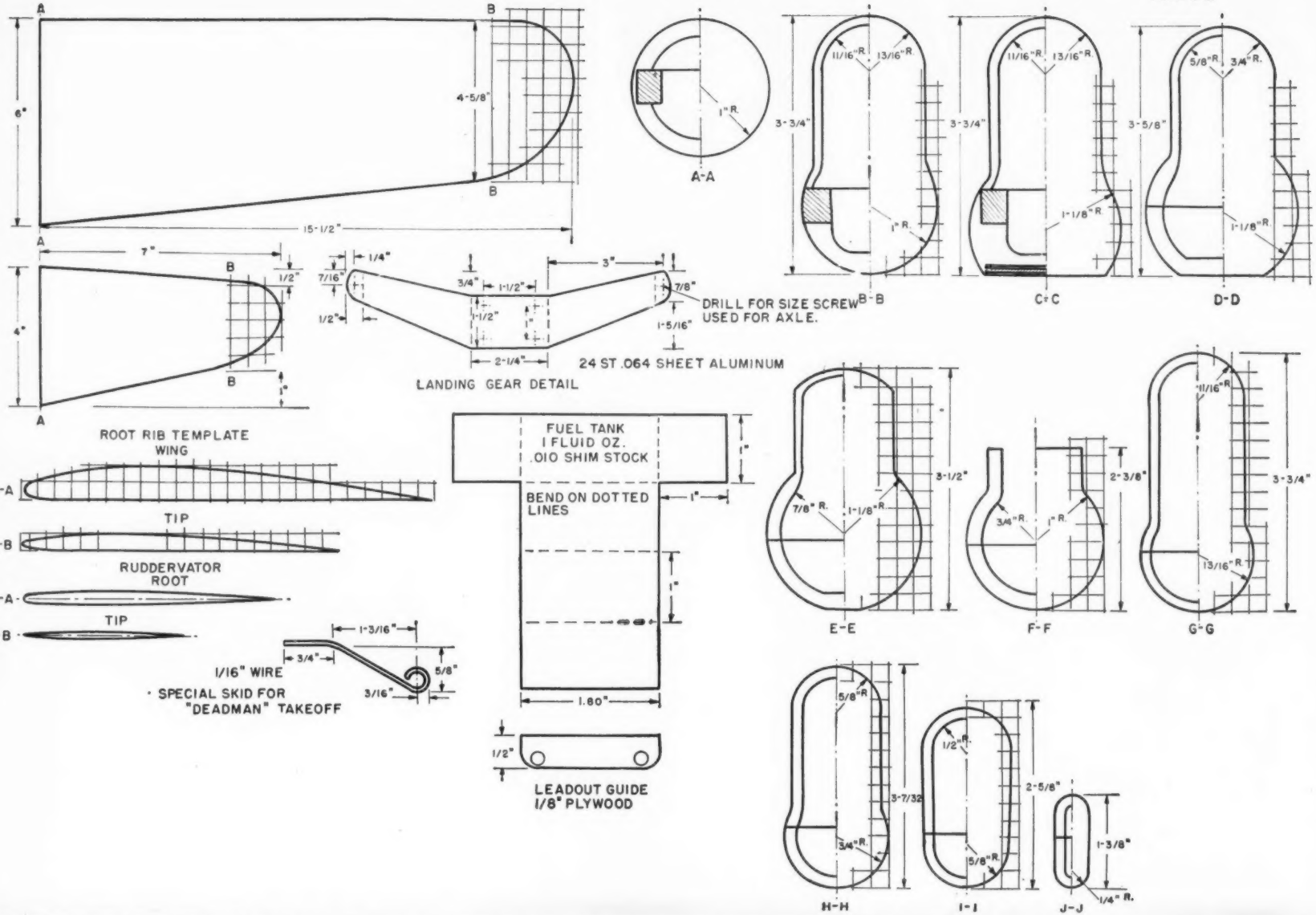
Up to this point you can see how many possibilities are on the horizon for such an event. There are thrills aplenty when two or more of these little ships are given the green flag to start a trophy dash or one of the other highly competitive races. With no effort at all these *Team Racers* have hit a snappy 85 mph. Of course the longer races are more interesting in that anything can and usually does happen, and the ground crew has to be on its toes with "fuels and tools" necessary to put their ship back into the race as fast as possible.

Each type of race entered requires thought before going out into the circle. For instance, in a 1/2 mile acceleration race you want to get all the rpm possible for that fast getaway; this calls for a low pitch prop. On the other hand, in a 5 or 10 mile race you have to sacrifice some of those rpm's so your limited fuel supply will last as long as possible yet keep you at a competing speed. In these long races where pit stops are necessary fuel tanks which can be filled quickly are a good idea. With the glo plug era here, ignition troubles are eliminated from this event. However a hole in the cowl the size of a small plug wrench is advisable; this will allow access to plug for elimination of excess fuel. For more realism, "deadmen" are used for takeoff instead of hand release. With a pull of a single string, one starter can release up to four ships.

New angles are constantly being devised for making the racers easily accessible for repairs and more realistic in flight. Perhaps the question arises why we chose a motor having a displacement of .299. It all boils down to one thing: more fellows own an engine of that size than the very large or small variety. This size engine will produce enough power for a very interesting speed. Also, fuel consumption is at a happy medium. From the spectators' viewpoint a ship's speed is of least importance. "The important thing is," remarked a spectator at a recent meet, "you can see these little Team Racers; they are not like those other queer looking noise

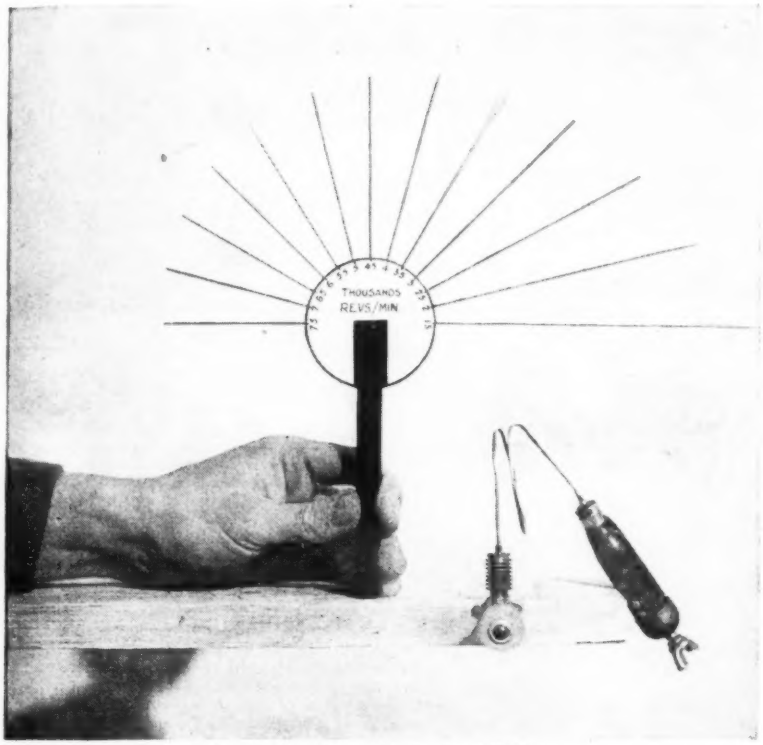
(*Turn to page 37*)

PLATE 2

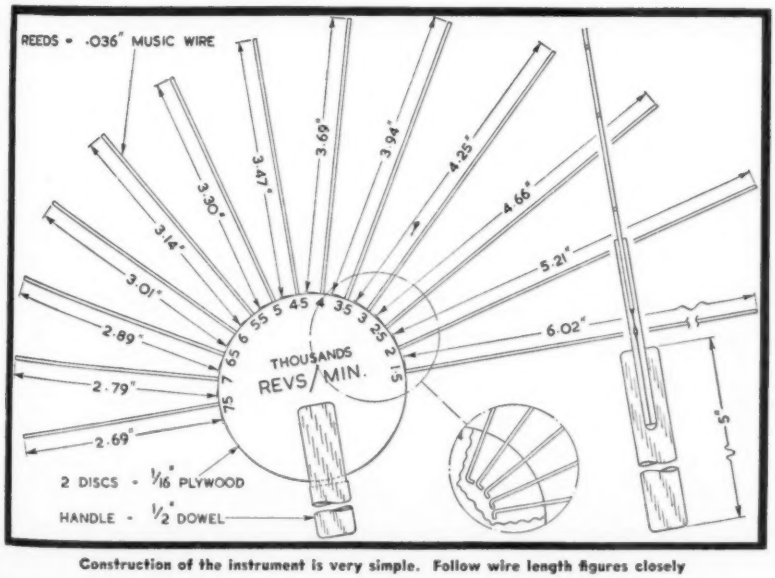

A
B
6"
4-5/8"
15-1/2"
A-A
1" R.
3-3/4"
11/16" R.
13/16" R.
1" R.
B-B
3-3/4"
11/16" R.
13/16" R.
1-1/8" R.
C-C
3-5/8"
5/8" R.
3/4" R.
1-1/8" R.
D-D
7"
1/2"
4"
1/4"
7/16"
1/2"
3/4"
1-1/2"
3"
7/8"
1-5/16"
2-1/4"
DRILL FOR SIZE SCREW USED FOR AXLE.
24 ST .064 SHEET ALUMINUM
LANDING GEAR DETAIL
ROOT RIB TEMPLATE
WING
A-A
TIP
B-B
RUDDERVATOR
ROOT
A-A
TIP
B-B
1-3/16"
3/4"
5/8"
3/16"
1/16" WIRE
SPECIAL SKID FOR "DEADMAN" TAKEOFF
FUEL TANK
1 FLUID OZ.
.010 SHIM STOCK
BEND ON DOTTED LINES
1"
1"
1.80"
1/2"
LEADOUT GUIDE
1/8" PLYWOOD
E-E
7/8" R.
1-1/8" R.
3-1/2"
F-F
3/4" R.
1" R.
2-3/8"
G-G
11/16" R.
13/16" R.
3-3/4"
H-H
5/8" R.
3/4" R.
3-7/32
I-I
1/2" R.
5/8" R.
2-5/8"
J-J
1-3/8"
1/4" R.

CO^2 Tachometer

by J. H. MAXWELL



Tachometer in action—note vibration of 3500 rpm



Construction of the instrument is very simple. Follow wire length figures closely

EVERY CO2 enthusiast, it seems has his own ideas about how to get the last inch ounce of energy out of those cartridges. Some fellows go in for long motor runs with the cylinder screwed well up; others prefer short runs with plenty of power. Still others file down the pin on the piston head, fit a water jacket on the bulb, or solder washers on the pipe line.

The trouble is, nobody can *prove* that his favorite technique is effective, without being able to quote RPM figures. But how can you quote RPM figures when none of the tachometers now available can cope with the constantly changing speed of a CO2 motor?

With this problem in mind, we went to work on some experiments and eventually devised the instrument described in this article. This tachometer is a development of the vibrating reed principle, but instead of having a single reed of variable length it has a battery of reeds of fixed length. If it is held in contact with the motor or motor mount, each reed in turn vibrates. The speed of the motor, at any instant, is given by the RPM figure against the reed which happens to be in motion.

CONSTRUCTION. The materials required to build this tachometer are a piece of 1/16" plywood, a 5" length of 1/2" diam. dowel, and about 6' of music wire. The diameter of the wire determines the lengths of the reeds. We used .036" wire as shown on the drawing, but if you cannot obtain this size take the nearest available, and calculate the lengths by multiplying the .036" wire lengths by the appropriate factor from the table below.

Wire diameter	*Factor*
.030"	.912
.031"	.927
.032"	.942
.033"	.957
.034"	.972
.035"	.986
.036"	1.000
.037"	1.014
.038"	1.027
.039"	1.040
.040"	1.053

(Example: — Suppose you are using .034" wire and want to know the length of reed for 3000 rpm. The length of .036" wire at 3,000 rpm is 4.25". From the table, the factor for .034" wire is .972. Therefore the new length is 4.25" x .972 = 4.13".) If possible, have the wire miked so that you know its exact diameter.

Start construction by cutting two 2-1/2" diam. discs from the plywood. Next cut 13 pieces of wire, making each one an inch longer than the length required. Make a right angle bend in each wire at 3/32" from one end.

On a sheet of paper draw a 2-1/2" diam. circle, with 13 lines radiating from it at 15° intervals. (If you prefer you can trace this off the drawing, or use the drawing itself). Lay one of the discs on the circle and fix each wire to it with a spot of glue. Now apply liberal quantities of glue (not balsa cement) all over the disc, and place the second disc on top. Press the two firmly together in a vise or clamp and leave overnight, or until the glue is really hard.

Cut a slot 1/8" wide in one end of the dowel. The easiest way of doing this is to drill a 1/8" diam. hole through the dowel 1-1/4" from the end; then make saw cuts from the end, running into the hole. Fit the disc and wire assembly into the slot, and glue.

(*Turn to page* 39)

Material Matters

In solid or non-flying model construction, the materials used are at least as important as *how* they are used

by ***FREDERICK K. HOWARD***

A realistic instrument panel is a must in scale model work

THE detailed or exhibition scale model is distinct from other model types. It has no "performance"; it does not fly. Uncomplicated by weight restrictions or size requirements, its construction features a wide variety of materials and building techniques. Because of this, materials and their uses are sometimes thought to depend only on personal preference, convenience, or the builder's ingenuity. Important as these factors may be, there are other more basic considerations.

In every model type, requirements can be set up which must be met by any proposed material, and these requirements always relate more to the purpose of the model than to the modeler's convenience. If the purpose is the accurate copying in miniature of some particular airplane type, it is possible to list at least three requirements for any material: (1) it must be capable of being shaped precisely by one means or another; (2) it must create an effect similar to that given by the corresponding feature of the airplane being modelled; (3) it must be sufficiently strong to carry any strain imposed on it and durable enough to last a long time.

These requirements are quite different than comparable ones that might be listed for other model types since the purpose of the scale model differs fundamentally from the purposes of flying models. Materials suitable for flying models are then not necessarily appropriate for scale models. The "carry-over" of materials or construction methods from flying to non-flying types is rather limited, and in general it is undesirable to adopt the balsa-tissue-dope technique in exact scale construction.

Spruce or pine, silk, metals and plastics are the most common materials. Many others can be used but these have much the same position in scale model work that balsa, tissue, dope and piano wire have in the average flying model. The use of considerably stronger material is in the interest of durability—the expenditure of hundreds of hours on an accurate detailed model is justified only if the results are permanent. The best scale model materials unfortunately cannot be worked as easily as the usual flying model materials.

Certain materials and the ways in which they may be used are illustrated in the accompanying photographs. These adaptations will be described here in some detail but it should be understood that there are many other ways of modeling any particular scale feature. The examples to be given represent methods proven satisfactory. They may in addition indicate the diversity of uses of some scale model materials. The photos are of an exhibition model built to a scale of 1 in. to 1 ft. of an original, single-place sport plane. In general design and dimensions it is similar to the Rose *Parakeet* of the mid-thirties. The model is useful in illustrating the ways in which certain materials may be utilized. The construction is typical, and the materials fairly representative, of the detailed scale field. Overall dimensions of the model are span 22 in., length 16.75 in., height 6.625 in.

One of the most useful scale materials undoubtedly is spruce. This wood is ideal for structural members—spars, longerons, or stringers; and it is superior to pine in parts that require accurate carving—interplane struts or scale propellers, for example. The best spruce is even textured, straight grained, and has little tendency to splinter even when shaped very thin. (A likely source of "aircraft grade" spruce is your local airport. A section of a broken spar or a couple of discarded stringers may provide enough material at a nominal cost for quite a few scale models.) In general, spruce is the scale model equivalent of balsa and it is suggested that balsa be used only for those parts not under strain when the model is handled or, in the case of fabric covered models, from the tension of the covering. In the model illustrated spruce is the chief structural material. In addition to wing spars, it was used in 1/64 sheet to simulate the conventional leading edge cover of fabric wing structures, and in strips of 1/20 in. thickness ("planked") to suggest a molded monocoque fuselage construction. The propeller was carved from a laminated block of spruce and redwood; the struts are spruce in streamlined section. The extent to which this material can be used depends on the model but the average scale model can utilize spruce in these or similar ways.

As another example of a material suitable for various model parts consider transparent plastic sheet. Cellulose acetate sheet is one of the softer plastics usually available in plastic stores. It can be formed into engine cowlings, canopies, fillets, and in general is suitable to duplicate any airplane part having compound curvature. Engine cowlings for any scale model are apt to be troublesome since they cannot be formed by the simple bending of a flat sheet. The curve is invariably in both directions. Further, if the engine is modeled in detail it is next to impossible to hollow a wood block accurately enough to fit the engine properly. Plastic sheet is thus ideally suited for this type of feature. The cowling shown, which is similar in design to those found on many light planes, was formed from .020 cellulose acetate. This material can be worked to almost any shape (as long as the curvature is not too sharp) by heating until it becomes pliable and immediately stretching over a solid wood form carved to the desired shape. In the construction of the cowling illustrated, a hard balsa block was carved to the exact shape of the fuselage forward from the firewall. This form was then reduced in size by the thickness of the plastic sheet and cut into three parts to provide separate forms for the top, bottom ,and nose section of the cowling.

A few practical suggestions for working this plastic may be helpful:

1. The wood form should be finished with the finest sandpaper but not doped.
2. It will be found convenient to mount the form above but fastened rigidly to a plank of a size that will fit into your oven. Heat the form along with the plastic.
3. Experiment with plastic scraps to learn the degree and time of heating required to soften.
4. Wear leather or rubber gloves when handling the heated parts.
5. Re-heat the plastic and the form if desired shape is not obtained. It will probably require several attempts since the

The beautiful finish on every part of this model is a sign of top grade craftsmanship

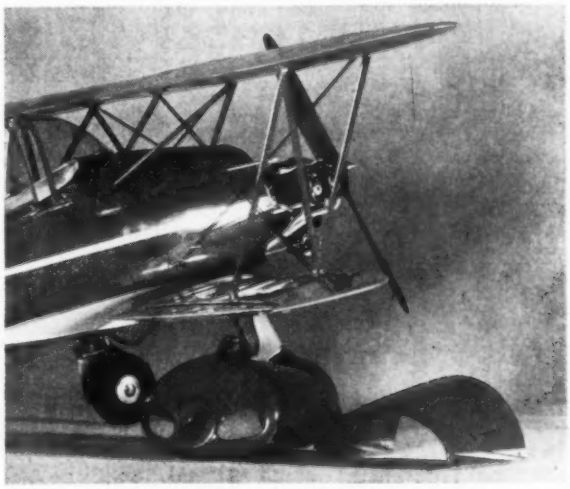
length of time that the plastic remains pliable after removal from the oven is extremely short.

6. Molded plastic model parts should not be finished with clear or pigmented dope.

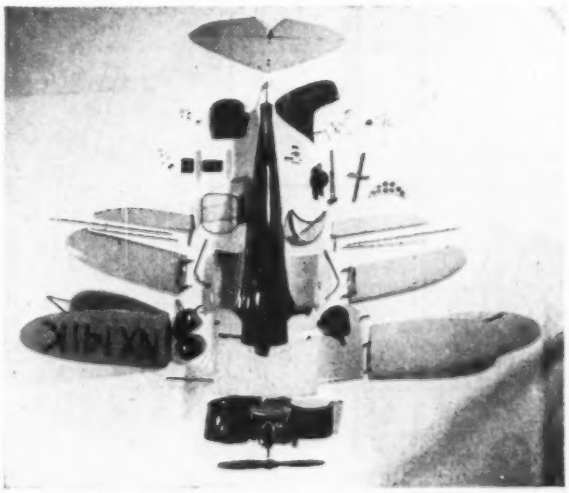
The canopy illustrated was molded over two forms—one for the fixed forward section, the other for the sliding section—in the same manner and from the same material as the engine cowling. In this case, however, care was taken to retain transparency. Overheating produces flaws in the finished piece which can be removed only if they occur on the surface. A loss in transparency due to surface flaws may be corrected by use of fine rubbing compound.

Of the various metals suitable for scale model work, the most useful is probably brass. Metals are required in the construction of various fittings, engine parts, rigging wires, control systems, landing gears, and in any part of the model's structure of small dimensions under considerable strain. If the part being modeled is to undergo neither strain nor wear (as simulated engine parts, inspection cover plates, or details intended to add realism) any convenient metal will do. However, most of the metal parts on detailed models are subject to wear and a material harder than aluminum is ordinarily required. Brass has proven satisfactory in the duplication of fittings and operating systems. (Brass tubing, sheet, or plate in various sizes are available at some model stores and all hardware supply firms.) The uses of brass in the model illustrated are typical of the way this material may be adapted. All landing gear fittings, strut fittings, and the bearing surfaces of the control system were formed from sheet brass. Brass tubing of 1/16 diam. was the basic material in fashioning a wide variety of parts. For example, the canopy edges are encased in 1/16 brass tubing, flattened, split, and bent to the appropriate curve; the trailing edges of the wing panels and tail surfaces are formed from this material, flattened slightly, filed to a triangular section, and notched for each rib. The aileron and elevator connecting rods, the attachment fittings on the extremities of the struts, and the rails on which the canopy slides, all utilize 1/16 brass tubing. Any detailed model, regardless of scale or type, has features requiring brass sheet or tubing.

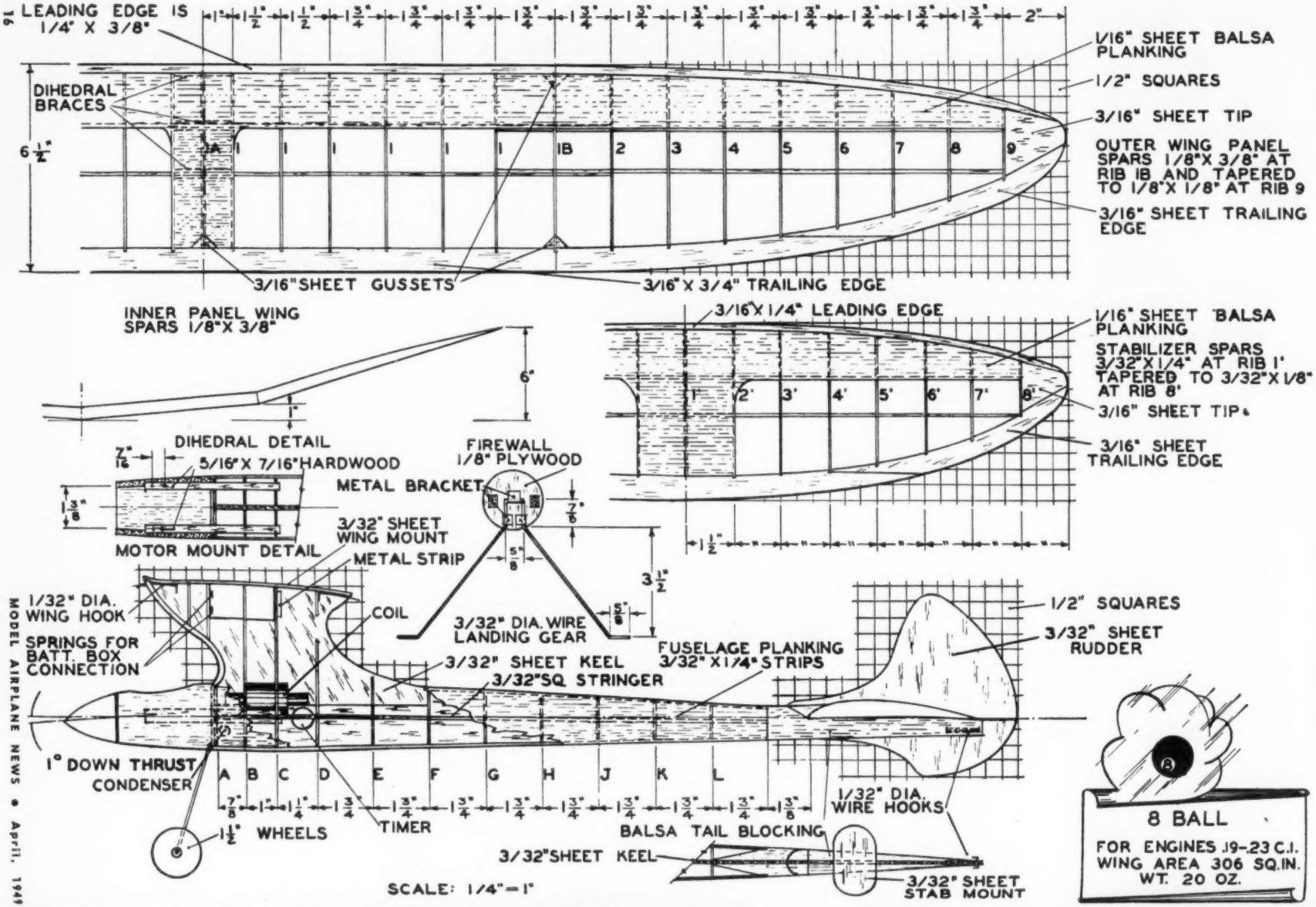
In simulating hydraulic or spring landing gear shock struts, sections of brass or copper tubing of appropriate size can often be used effectively. In the usual design, the landing gear leg and the shock strut are linked together with a mechanism called "scissors" the purpose of which is to hold the wheel axle in proper alignment. Welding rod or tubing which fits precisely into the shock strut section can be utilized for the landing gear leg while brass sheet can be used to form the two links of the scissors. The method of attachment and the shape of the scissors linkage of course depends on the particular design. In most designs closely fitting metal pins can be used to assemble the parts. (These metal pins can often be sections of common paper clips or small diameter iron wire.) Compression springs placed in the upper part of the shock strut produce the shock absorbing action. (Valve springs from the older type inner tube may be suitable.) (*Turn to page* 36)



Accurate cowling like this is not too difficult if you follow directions

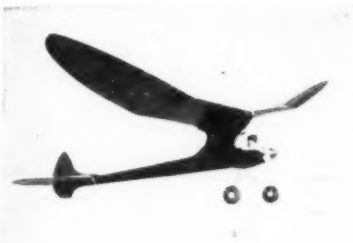


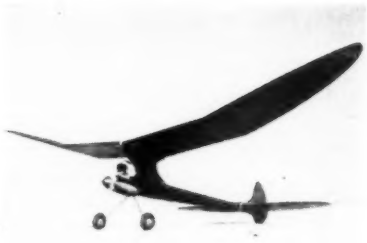
This model can be disassembled just like the real plane


LEADING EDGE IS 1/4" X 3/8"
1/16" SHEET BALSA PLANKING
1/2" SQUARES
3/16" SHEET TIP
OUTER WING PANEL SPARS 1/8"X 3/8" AT RIB 1B AND TAPERED TO 1/8"X 1/8" AT RIB 9
3/16" SHEET TRAILING EDGE
DIHEDRAL BRACES
6 1/2"
3/16"SHEET GUSSETS
3/16"X 3/4" TRAILING EDGE
INNER PANEL WING SPARS 1/8"X 3/8"
6"
1"
DIHEDRAL DETAIL
5/16"X 7/16"HARDWOOD
3/16"X 1/4" LEADING EDGE
1/16" SHEET BALSA PLANKING
STABILIZER SPARS 3/32"X 1/4" AT RIB 1' TAPERED TO 3/32"X 1/8" AT RIB 8'
3/16" SHEET TIP
3/16" SHEET TRAILING EDGE
FIREWALL 1/8" PLYWOOD
METAL BRACKET
MOTOR MOUNT DETAIL
3/32" SHEET WING MOUNT
METAL STRIP
1/32" DIA. WING HOOK
SPRINGS FOR BATT. BOX CONNECTION
COIL
3/32" DIA. WIRE LANDING GEAR
3/32" SHEET KEEL
3/32"SQ. STRINGER
FUSELAGE PLANKING 3/32" X 1/4" STRIPS
1/2" SQUARES
3/32" SHEET RUDDER
1° DOWN THRUST
CONDENSER
A B C D E F G H J K L
1 1/2" WHEELS
TIMER
1/32" DIA. WIRE HOOKS
BALSA TAIL BLOCKING
3/32"SHEET KEEL
3/32" SHEET STAB MOUNT
SCALE: 1/4"=1"
8 BALL
FOR ENGINES .19-.23 C.I.
WING AREA 306 SQ.IN.
WT. 20 OZ.

EIGHT BALL

By RAY R. SCHOFIELD





DON'T let the name fool you! The *Eight Ball* has a high performance and is a stable, consistent flyer. Although designed exclusively for Class A free flight events the model is large enough for small Class B engines.

Eight Ball was developed from a series of model airplane designs. The better points of several earlier designs are incorporated in this model to maintain a more efficient and stable principle of design and construction, thus making it a good contender in any A or B event. Much effort and planning was put into the development of this model.

The first test flights proved more than satisfactory—no adjustments were needed. In each successive flight the engine was advanced slightly and the flight showed improvement. The model has a very fast climb at about 70° to the horizontal and maintains this angle constantly with no dips or momentary stalls. Because of the high lifting stabilizer the model has a quick recovery to a horizontal glide, and the glide is smooth and slow. The ship does more than just glide, it shows definite soaring tendencies and will ride the weakest thermals. On its seventh test flight, *Eight Ball* soared for more than an hour with only a 12 second engine run and landed in Great Salt Lake, more than four miles from the point of takeoff.

Flying it is lots of fun, and it offers excellent contest material. The original has been adjusted to climb to the right and glide in left circles or vise versa, showing favorable spiral stability with quick, easy adjustment.

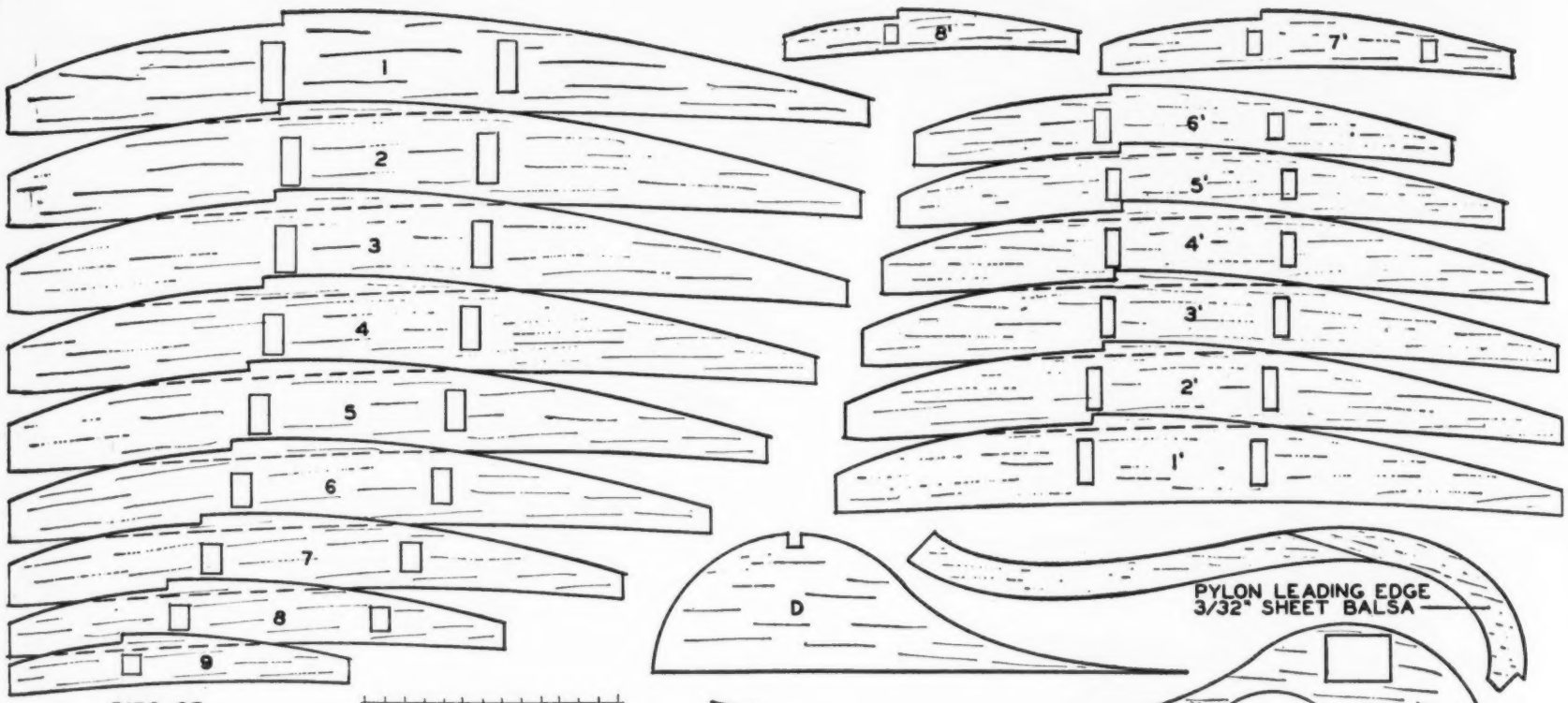
The plans are to be scaled to full size before beginning construction. The pylon leading edge, wing and stabilizer ribs, and formers B to D are shown full size; this will help in enlarging the plans.

CONSTRUCTION. The fuselage, built around a 3/32" sheet balsa keel, is exceptionally strong and will stand much abuse. This method was used to simplify the construction. When cutting out the keel allow space for coil, timer, condenser, and battery box; then pin on enlarged fuselage plan. Cut out formers A to D from 3/32" sheet balsa, and formers E through L from 1/16" sheet balsa. Formers A, and E through L, are easily made by using a compass and drawing the correct size circle directly on the balsa. A table of former sizes is given on the plan. Be sure to cut the formers to the exact diameter and notch out space for keel and 3/32" square stringers in order to assure a smooth planking job. Then glue half of each former to the keel. Shape tail blocking and glue into place. Cut two pylon leading edges from 3/32" sheet balsa and glue one on the pylon as shown on plan. Insert one motor mount of 5/16" x 7/16" hardwood through formers A, B and C, check for accurate alignment. Now a 3/32" square stringer is glued into place.

After allowing sufficient time for drying, remove the half-fuselage from plan. A metal strip and springs for pen cell connections are fixed in place as shown on plan. The ignition is then glued into place and wired securely. Recheck wiring so no trouble will occur in the ignition system after the fuselage is completed.

Assemble remaining half of the formers, tail blocking, 3/32" square stringer, and motor mount to the other side of the keel. Check motor mount alignment with the motor mount detail. This detail is shown for a *Bantam* engine. If another type engine is used the builder will have to make his own motor mount adjust-

(*Turn to page* 54)

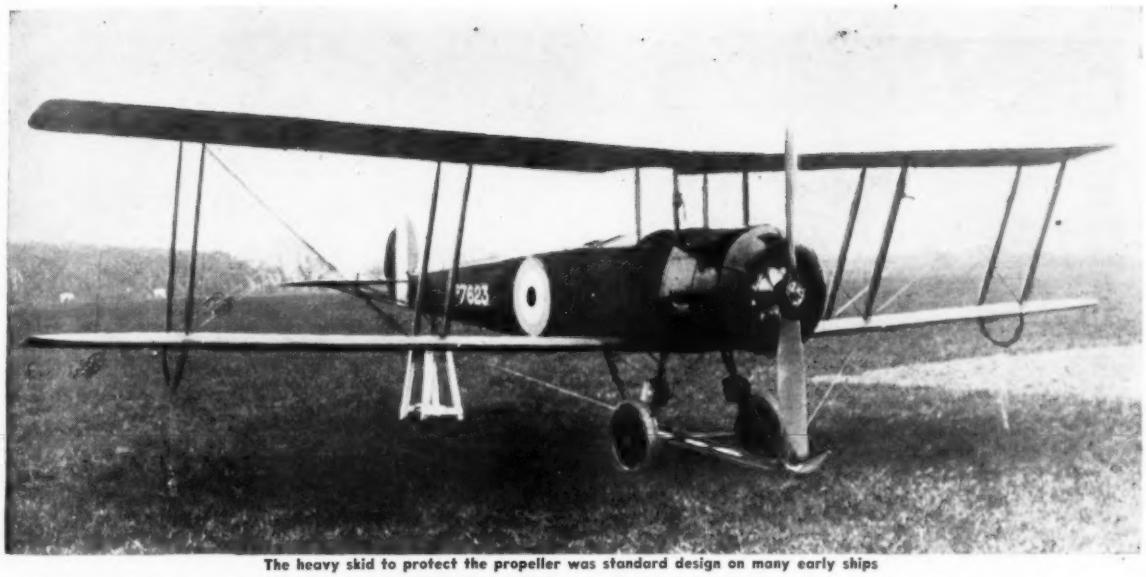


SCALE: FULL SIZE
UNLESS MARKED OTHERWISE

NOTE:
CUT OUT SPACE FOR KEEL AND
3/32" SQ. STRINGERS.

NOTE: CUT OUT SPACE FOR KEEL AND 3/32" SQ. STRINGERS.

SCALE: FULL SIZE UNLESS MARKED OTHERWISE

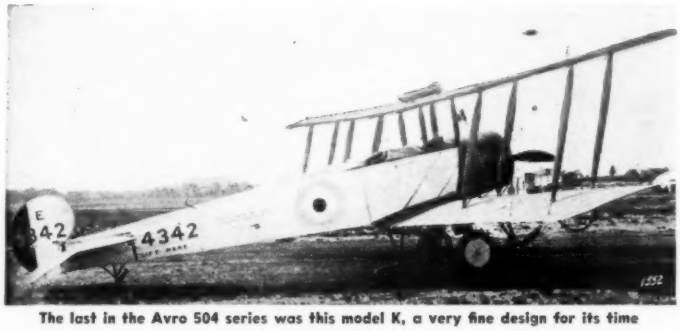


The heavy skid to protect the propeller was standard design on many early ships

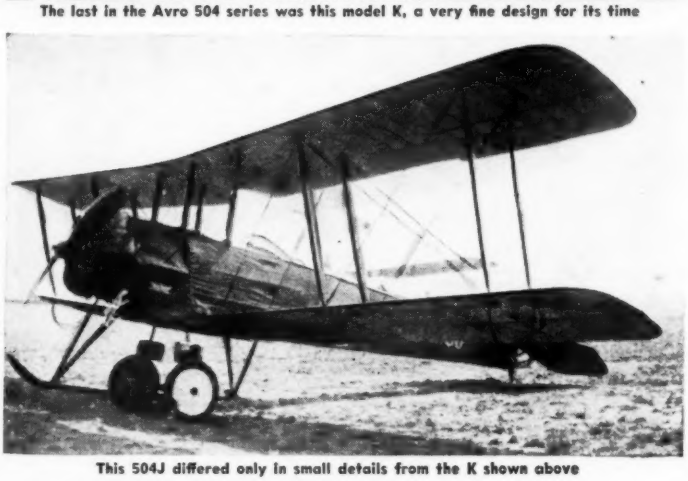
WORLD WAR I

by Robert C. Hare

The story of an aviation pioneer and his highly successful World War I designs



The last in the Avro 504 series was this model K, a very fine design for its time



This 504J differed only in small details from the K shown above

PART I

ONE of the most famous names in British aviation is *Avro*, not only because it has represented a highly successful line of aircraft since the earliest days of aviation, but because the man behind *Avro* was the first Englishman to fly in his homeland.

A. V. Roe, whose combined initials and last name were a "natural" for an aviation business, captured these honors at Brooklands in July 1908 after numerous attempts to fly by such illustrious compatriots as Cayley, Henson and Stringfellow. He used a simple biplane of his own design for the feat, and he was known as one of the earliest pioneers of the tractor type airplane.

In July 1909 A. V. Roe flew what is believed to be the first successful man-carrying triplane at Lea Marshes. This lightweight—which boasted a triplane stabilizer and biplane rudder as well as a tail wheel in place of the more popular skid—was powered by a *J. A. P.* motorcycle engine, which developed only 9 hp!

During 1910 Roe built two more triplanes with 30 and 35 hp engines, and the next year the biplane was resurrected in the form of a very successful exhibition machine which was flown by Howard Pixton, one of Britain's most famous early-day pilots, in various exhibitions in England.

As did so many aviation pioneers, pilot-designer Roe finally got to the point where he needed backing to stay in business. As airplanes were improved, they became more complicated and expensive. It was at this stage in the development of aviation—about 1911—that many pioneers had to give up all their groundlaying work for a ridiculously few dollars, pounds, marks or francs.

Fortunately for Roe, however, there was both money and faith in aviation in the family. His brother, H. V. Roe, who owned a webbing manufacturing concern at Manchester, came to his rescue and provided financing that turned the tide of creditors. With renewed resources, A. V. built a sporting two-seater for a Mr. Duigan, Australia's first aviator, and several 50 hp *Gnome*-engined biplanes for the British War Office. The latter were actually the first British designed and built airplanes to be delivered to the British Army. These were followed by a totally enclosed biplane entered in the famous British military trials of 1912 which were held at Salisbury Plains.

TYPE 504.—All this experience prepared A. V. Roe for the design of one of the most remarkable airplanes of all times: the *Avro 504*. While other

(*Turn to page* 40)

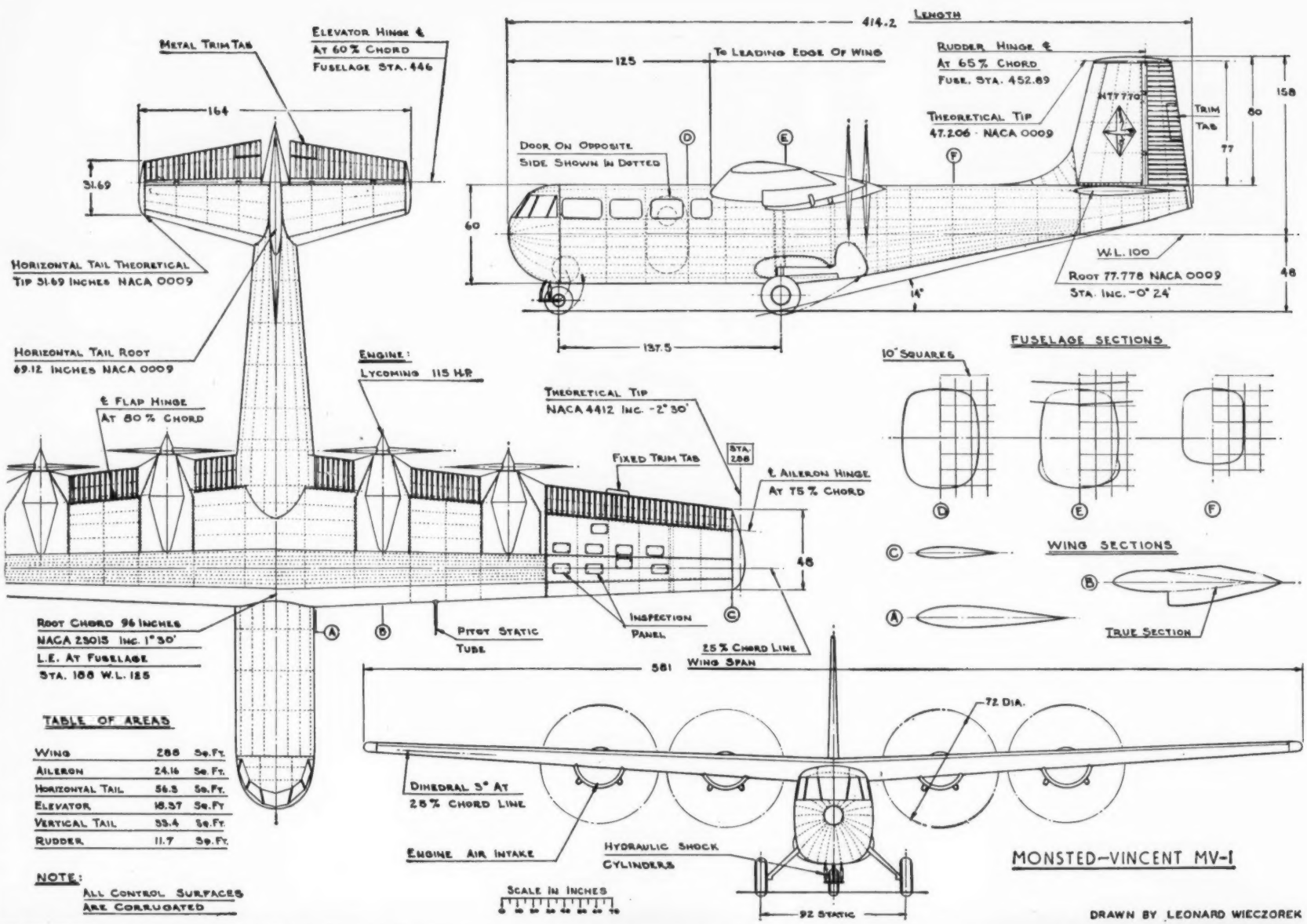


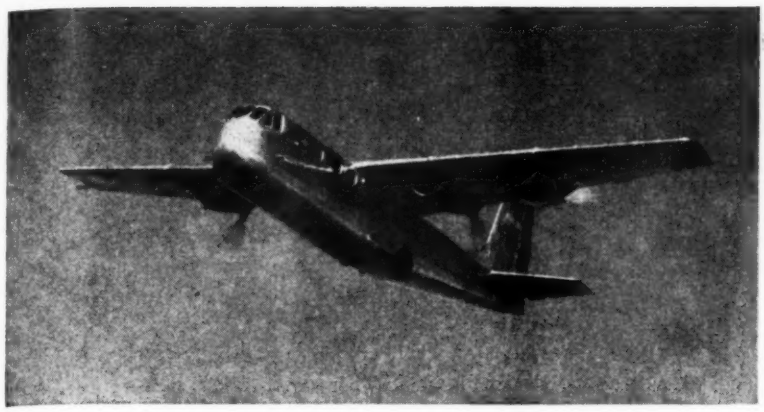
Table of Areas

Wing	288	Sq. Ft.
Aileron	24.16	Sq. Ft.
Horizontal Tail	56.8	Sq. Ft.
Elevator	18.37	Sq. Ft.
Vertical Tail	33.4	Sq. Ft.
Rudder	11.7	Sq. Ft.

NOTE:
All Control Surfaces
Are Corrugated

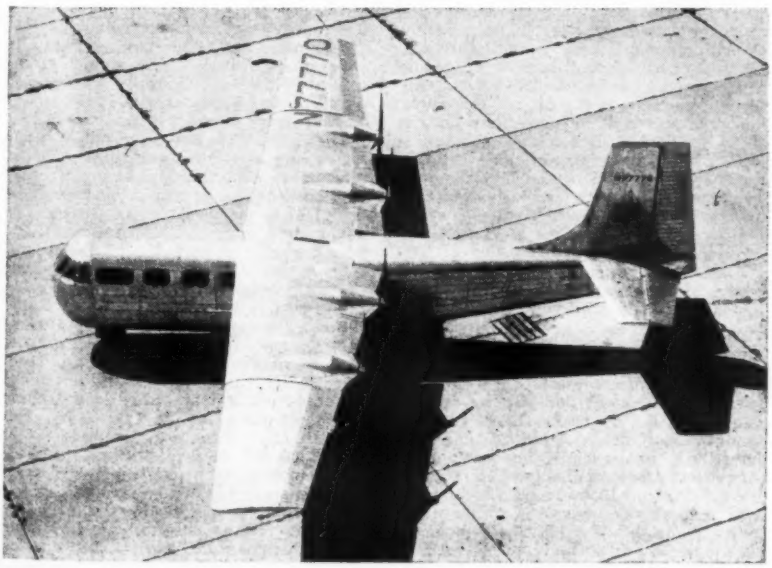
MONSTED-VINCENT MV-1

DRAWN BY LEONARD WIECZOREK



★ STAR FLIGHT ★

by Robert McLarren



"EXECUTIVE travel" is a new and glamorous phase of flying. During the 'thirties it was just "men flying on business"—but not in 1949, the year of the "Fair Deal," the "lukewarm war" and the "video smile." Executive travel is rapidly becoming something more than another catch-phrase. Executives of industry are finding that the scheduled airlines do not provide the tailor-made air travel required for the greatest economy and effective utilization of their travel time.

For example, one sales executive might want to visit twelve small towns in the shortest time possible but they are scattered, some have no scheduled airline service and others are serviced only at irregular hours. To avoid expensive "layovers" of several hours, to permit takeoff immediately upon conclusion of a conference, to permit flying directly to the next town on the schedule; all of these considerations point towards the privately owned "airliner" for the busy executive.

But because it is called upon to provide such convenience and speed, the executive airliner must be fast, dependable and economical so that its cost of operation does not exceed that of the railroad or the scheduled airliner, when considerations of time and convenience are equated into dollars and cents. Obviously the popular "lightplane" doesn't fit these specifications. It is too slow, too short range and too uncomfortable. Even the Ryan *Navion* and Beech *Bonanza*, leading all metal four-place planes, do not qualify in every respect to the needs of an executive party.

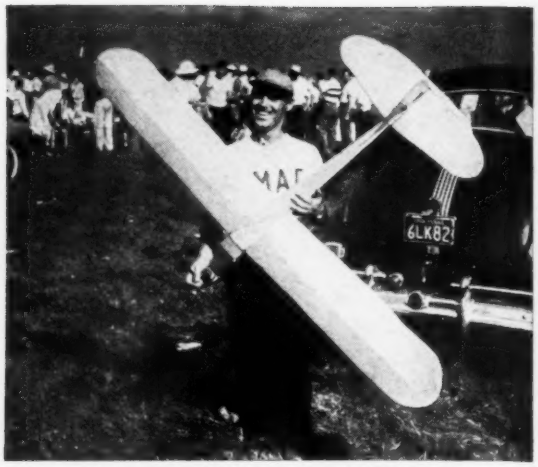
But two young Air Force veterans and a group of their associates have produced an executive airliner, the Monsted-Vincent *Star Flight*, our Plane of the Month, that approaches this goal as closely as modern design and engineering permit. It is indeed, a miniature airliner in every sense of the word and has been designed from scratch not as "everyman's" airplane (that fabulous goal of seemingly ever-retreating distance) but tailor-made for the busy executive party.

Col. Farley Vincent and Robert Monsted, president and vice president respectively of the new company, began thinking about the "ideal" privately owned business airplane while still in the Air Force, and as soon as they donned civies they formed Monsted-Vincent Aeronautical, Inc., in New Orleans. They were soon joined by Art Turner, former Lockheed engineer, and other engineers and mechanics and in January 1946 they all sat down to pool their ideas. All of their accumulated flying experience pointed to the need for safety in the air and that meant, first, an airplane that could keep right on flying after an engine failure. This basic requirement eliminated the single engine airplane, and they even argued against the two engine airplane (after recalling experiences of some of their mates during the war flying heavily loaded Curtiss C-46 *Commando* transports over the "Hump" in China). But all agreed that there had never been a four engined airplane that wouldn't fly well on three engines, and so the decision on four engines.

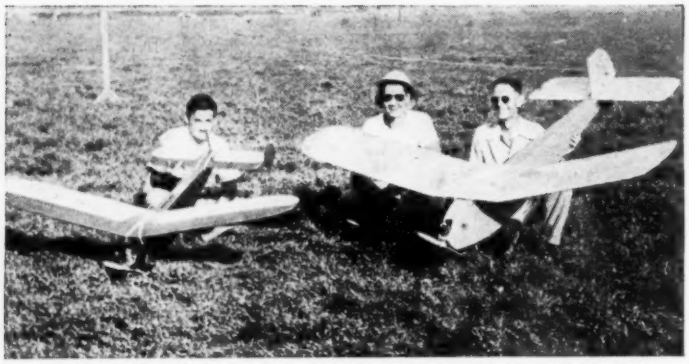
When it was borne in mind that the airplane was only going to carry four executives plus the pilot, it became obvious that the engines could be small. The Continental 85 hp aircooled horizontally opposed powerplant was selected, a four engine combination giving 340 hp ample for takeoff on short runways and rough

(*Turn to page* 47)

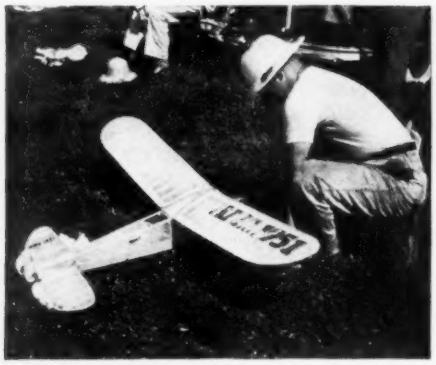
Jim Walker and his '48 Nats R. C. winner—it even has working ailerons!



George Trammell holds his second place winner



E. Foxworthy with twin tail job; team of L. Brown and J. Hughes with their big ship

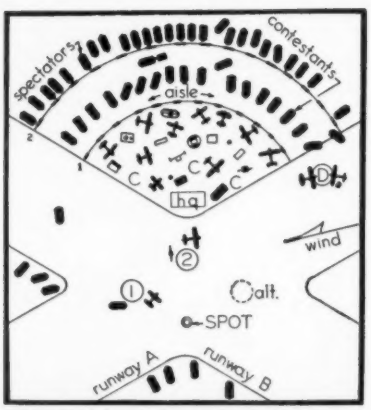


Leon Schulman flew Eran McElwees' *Drone*-powered plane

Championship

by H. H. Owbridge

Study these observations made by a contestant at the 1948 Nationals R. C. Event



Suggested layout for a radio control event

THIS is a one man discussion of what happened at the 1948 A.M.A. Nationals Radio Control Contest. It is the opinion of a contestant who participated in the event for the first time. Actually a round table discussion by all contestants would give a much broader picture of what took place, especially if it included those who had entered the event more than once in the past years. A crossection of the opinions of all the contestants scattered throughout the U.S. would be difficult to obtain, so, without regard to how far our neck protrudes and with apologies ready for any misrepresentations (which will be small at most), here goes.

First, the points of praise. These are many. All contestants will generally agree that the contest was very near perfect. It is a great event, a beautiful sport, and it cannot fail to be even more so in the future. The sharp increase in entries over past years indicate the trend. The flying site (Naval Air Station, Olathe, Kans.) could not be bettered. Clean concrete runways, soft fields of clover (and very friendly grasshoppers!), no dust, and a Navy that cooperated to the extent where a contestant might feel model aeronautics was just about the most important activity in the U.S. The latter statement can be made just as strongly for the A.M.A. and the Olathe Post of the American Legion. Contest direction and judging of the event were very well handled. The three Navy flyers who acted as R.C. judges were very conscientious and fair.

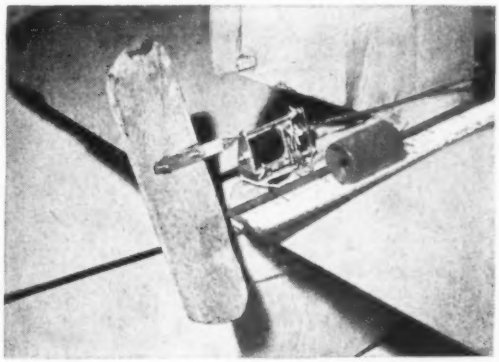
So much for the good points of the contest. Now let's be only human and pick out the points where improvement can be made in the future.

The spectators were a problem. They always are a problem—but you can't just send them home. The public must always be considered in any mass outdoor gathering. Also, the national contest must be advertised, witnessed and appreciated to insure public support. Not all the trouble the contest directors had in controlling the spectators was the fault of the spectators themselves. Much of it was due to the way the contestants distributed themselves around R.C. headquarters tent. Contestants drove their cars into a space just off the runway and to the left of the headquarters tent, and proceeded to check out their ships beside their cars. This practice left the contestants spread out for some 200 feet to one side of the headquarters tent, with plenty of extra space between each car. When spectators come to see something they don't stop coming until they are as close to what they want to see as possible. When they spied all

Lt. (jg.) G. W. Denby, at left, and Ens. R. O. Bottum were very popular judges

June Pierce, radio CD, Adm. Whitehead, Lanzo, Capt. Hungate

Flt. Lt. E. J. Lisle, RAF, on duty at Keesler Field, Miss. was a contestant



Latest *Rudevator* installed—round object is thermal cutout

Radio Control

the unused space between the contestants' cars they simply figured there was plenty of space left for a few more people. So they stepped over the rope barricade and thus gained their much desired closer look at the airplanes.

This situation is difficult to prevent without the added and impractical expense of fences, policemen, and even bleachers. One suggestion is offered that might be worth a try at the next Nationals. The main catch is that all contestants must agree to cooperate to give it a fair try. The suggestion calls for tactics similar to those used by our forebears who crossed the plains of America in the covered wagon when they prepared for an attack by hostile Indians. In short, form a barricade of contestants to discourage the onslaught of spectators.

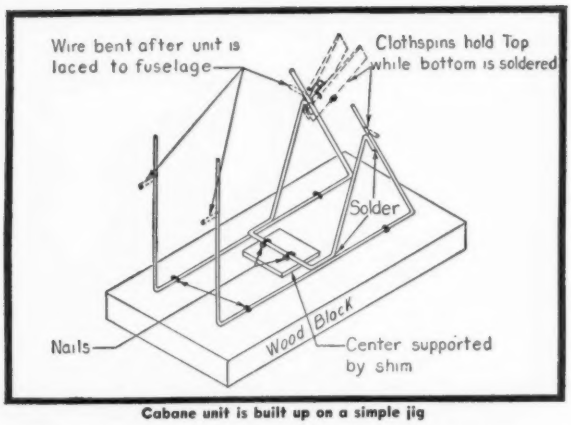
Fig. 1 will help to clarify. This drawing shows the intersection of two runways, as would be available at the Nationals. It should work just as well with only one runway or any other good line of demarcation. The contest directors headquarters (HQ) is located just off the runways at the intersection. Two rope barricades (1 and 2) are run in a partial circle as shown. Contestants' cars, along with the cars of contest directors, helpers, etc. should be parked 6 to 10 feet back from rope barrier No. 1 and all contestants should cooperate by setting their ships and equipment inside this barrier in the contestants space C. The space between barrier No. 1 and the contestants' cars is intended as a broad enough aisle for spectators to walk in to view the ships. The closer the ships are parked to the rope barrier, the less will be the tendency for spectators to come into contestants space C (we hope). They will be further discouraged if space C is not too large, but just comfortably filled with contestants' equipment. A wide enough "road" should be maintained between contestants' cars and barrier No. 2 to provide for passage of contestants' cars in and out of the area.

Naturally this will require one or more persons assigned to the control of parking. At the Nationals the control of spectators and where they parked their cars was a constant headache to those in charge. It seems that almost half of the P.A. announcements were orders bellowed at some non-cooperating (or confused) spectator either on foot or in a car. The layout suggested here is believed to offer advantages of crowd control without the undue expense of fenced areas, bleachers, or a large personnel assigned to policing the contest site. The two points of theory to keep in mind are: (1) Keep the contestants and their equipment in a well grouped area large enough for their own activities but small enough to discourage the mass entrance of spectators; (2) Place the airplanes (or as many of them as possible) near enough to the spectators barrier so that the onlookers can get an eyeful without the urge to cross the barrier.

Now there are other advantages that fall right in line with this theory. At the 1948 Nationals, communication between contest directors and contestants was quite poor. The above layout keeps the contestants within easy talking range of headquarters. It eliminates considerable confusion and unnecessary P.A. messages (such as occurred at the Nationals) as to "Where's so and so?" "Is he going to fly?" "Oh, he already flew." 'Well, what's his name is up next, is he ready?" etc. Jim Walker can chuckle at this—he came equipped with his own private P.A. system and could bellow back across the fields. The rest of us had to make the trip on foot.

Another advantage is that the P.A. speakers could be turned away from the contestants and directed toward the crowd for whom they do the most good. Very little comes out of a contest loud

(*Turn to page* 42)



Cabane unit is built up on a simple jig

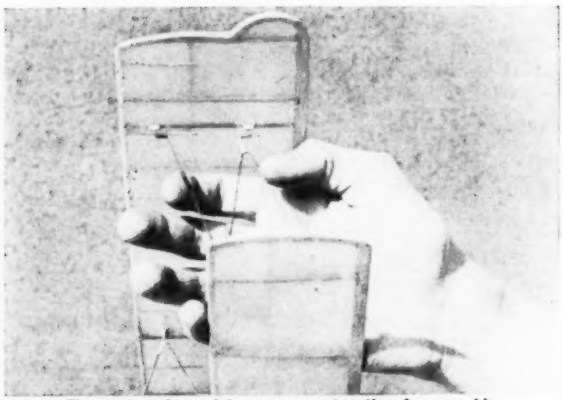
Detachable Bipe Wings

by PAUL McCRACKEN

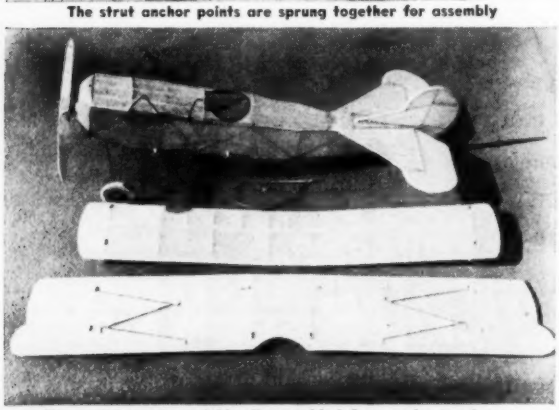
DETACHABLE wings offer a practical answer to most of the objections commonly registered by model builders against biplanes. Although the biplane is an intriguing efficient design, modelers tend to shy away from it because of the difficulties of assembly, adjustment, transportation, repair and storage.

Biplanes of the conventional design are quite rigid, because the wings are glued directly to the fuselage. This often means that the wings will rip away from the body and the struts when the model makes a rough landing. Repairing a ship after such a crash entails replacing broken ribs and longerons, and covering the wings again. Or, worse yet, the modeler loses his enthusiasm and turns to some other design. Because of the rigidity of construction, biplanes are easily damaged while being transported to and from the flying field. Also they take up so much space that they present a storage problem.

I long have felt that these difficulties could be eliminated if the principles of the detachable-wing contest model could be applied to the biplane. After you have read the details of construction which follow, I feel you will agree that this simple, practical method is the answer to your bipe troubles.



The strut anchor points are sprung together for assembly



The model can be quickly disassembled for repairs or storage

Use of detachable wings in no way detracts from appearance

Using a good set of plans, make the struts as units, one unit for the cabane and one each for the outer bay struts. The cabane strut is first bent to its proper shape from piano wire, as shown on plans. The wires are held by a jig for soldering, as indicated on the accompanying sketch. At this stage, only the accurate position of each individual strut need be considered since the length of each strut is determined later. The cabane unit now is laced in position atop the fuselage. This operation must come before installation of the cowl formers and stringers, as the cabane unit is laced directly to the fuselage longerons and crosspieces.

Since the lower wing is attached to the bottom of the fuselage with rubberbands, wing plates must be fitted into the lower longerons to accept the wing. These wing plates do not detract from the appearance of the ship, yet they permit the use of the one-piece lower wing which has all the advantages of the permanently attached wing, including accurate incidence and dihedral with the added feature of being removable.

Bay struts are constructed in the same manner as the cabane unit. The pieces of the bay struts are held in place for soldering by bending nails over the wires laid in position on a block of wood. As with the cabane strut, the bay struts are cut to size when the model is being assembled.

The struts are attached to the wings by hooking them into short lengths of aluminum tubing. In the upper wing it was found advisable to attach this tubing to a piece of square balsa stock installed adjacent to the rib, instead of lacing the tubing to the rib which would cause thread ripples on the upper surface of the covering. In the lower wing, however, the tubing is laced to the rib.

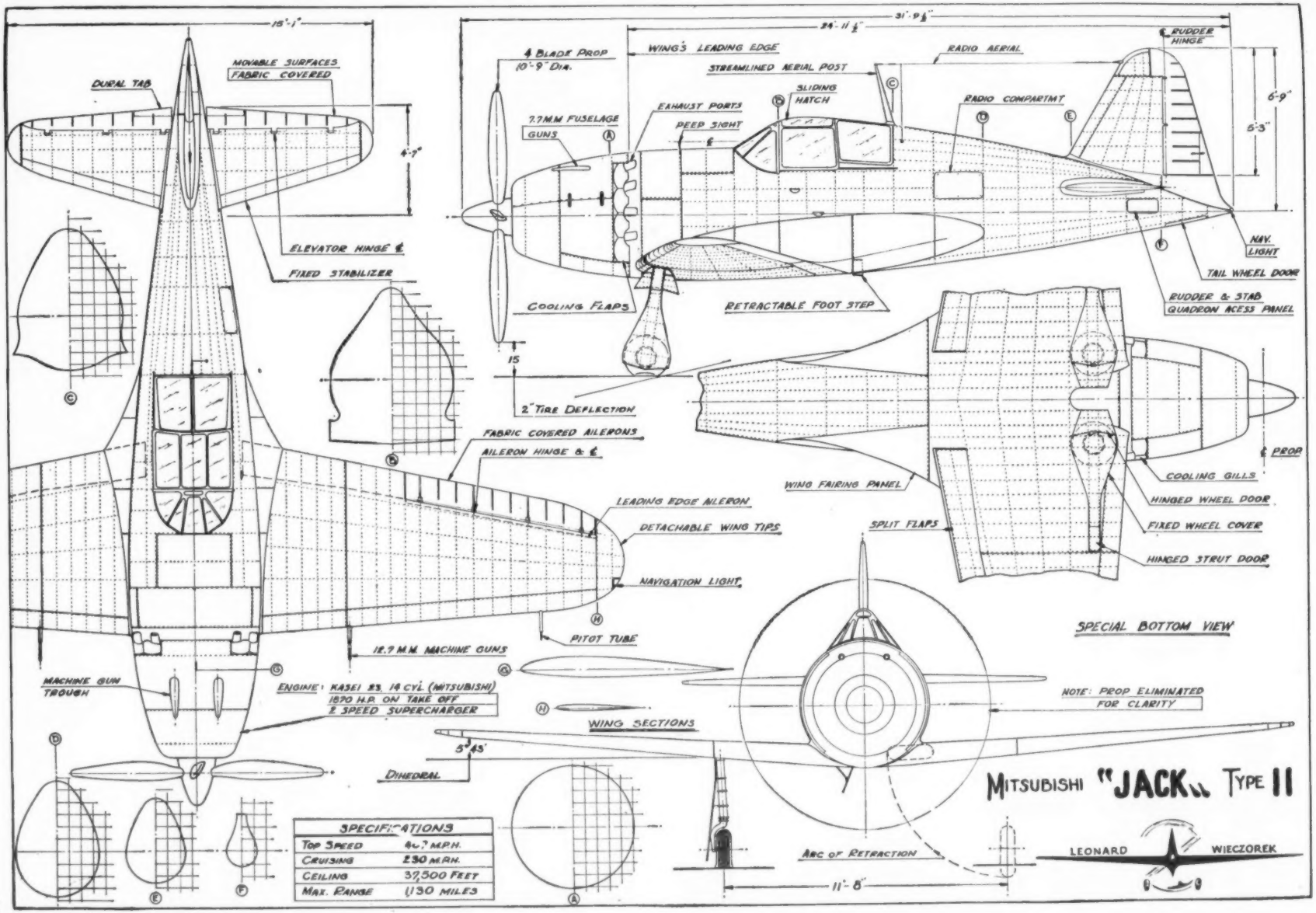
Now that the attachments are completed the model is ready for assembly. First, measure the distance between fuselage and upper wing, as it is shown on the plans from which the model is being constructed. Then cut the cabane struts to this length, leaving about 3/16" extra length (for a model of the size shown). Bend this extra length to fit into the aluminum tubing in the centersection of the upper wing. By placing a straight-edge on the stabilizer and measuring from it to the bottom of the upper wing, make certain the lower side of this wing is parallel to the stabilizer. Unless this is done there will be incidence in the wings which will cause the plane to loop violently. A little incidence can be added later, however, if the craft tends to dive under power. This is accomplished by bending the rear cabane struts and placing a small block of balsa between the trailing edge of the lower wing and the fuselage.

Now measure the length of the bay struts in the same manner that the cabane struts were fitted, again leaving 3/16" extra wire to be bent for anchoring hooks.

Each strut is installed by springing the anchor points together and slipping these points into the tubing. The spring tension will hold the struts secure.

The bottom wing is held to the fuselage by means of rubberbands drawn taut under the lower surface and anchored to crossmembers built into the fuselage immediately forward and aft of the leading and trailing edges.

Disassembly is a simple matter of slipping the rubberbands off the ends of the crossmembers and springing the struts together until their ends are free from the tubing.


15'-1"
DURAL TAB
MOVABLE SURFACES FABRIC COVERED
4'-9"
ELEVATOR HINGE ℄
FIXED STABILIZER
FABRIC COVERED AILERONS
AILERON HINGE & ℄
LEADING EDGE AILERON
DETACHABLE WING TIPS
NAVIGATION LIGHT
PITOT TUBE
12.7 M.M. MACHINE GUNS
MACHINE GUN TROUGH
ENGINE: KASEI 23, 14 CYL. (MITSUBISHI) 1870 H.P. ON TAKE OFF 2 SPEED SUPERCHARGER
WING SECTIONS
5°45'
DIHEDRAL
4 BLADE PROP 10'-9" DIA.
24'-11½"
31'-9½"
WING'S LEADING EDGE
STREAMLINED AERIAL POST
RADIO AERIAL
RUDDER HINGE
SLIDING HATCH
EXHAUST PORTS
PEEP SIGHT
7.7 M.M. FUSELAGE GUNS
RADIO COMPARTMT.
6'-9"
6'-3"
NAV. LIGHT
TAIL WHEEL DOOR
COOLING FLAPS
RETRACTABLE FOOT STEP
RUDDER & STAB QUADRON ACESS PANEL
15
2" TIRE DEFLECTION
WING FAIRING PANEL
℄ PROP
COOLING GILLS
HINGED WHEEL DOOR
FIXED WHEEL COVER
HINGED STRUT DOOR
SPLIT FLAPS
SPECIAL BOTTOM VIEW
NOTE: PROP ELIMINATED FOR CLARITY
ARC OF RETRACTION
11'-8"
SPECIFICATIONS
TOP SPEED 407 M.P.H.
CRUISING 230 M.P.H.
CEILING 37,500 FEET
MAX. RANGE 1130 MILES
MITSUBISHI "JACK" TYPE II
LEONARD WIECZOREK

design forum

Problems of stability are a constant worry to modelers—study this discussion

by Charles H. Grant

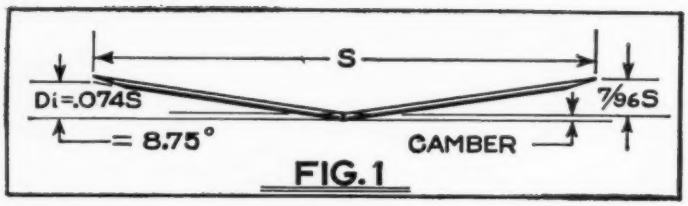


FIG. 1

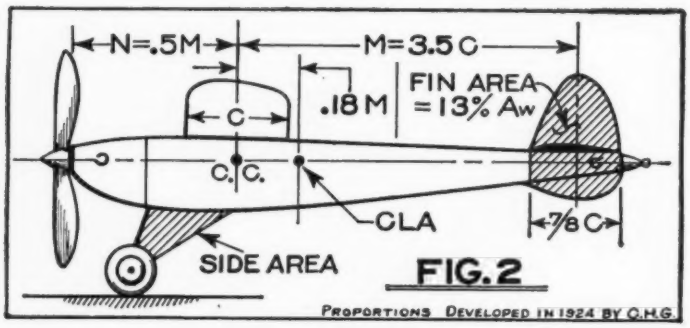
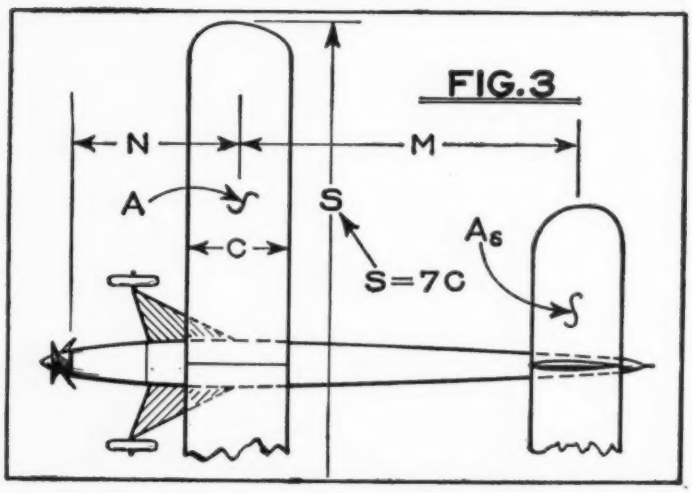
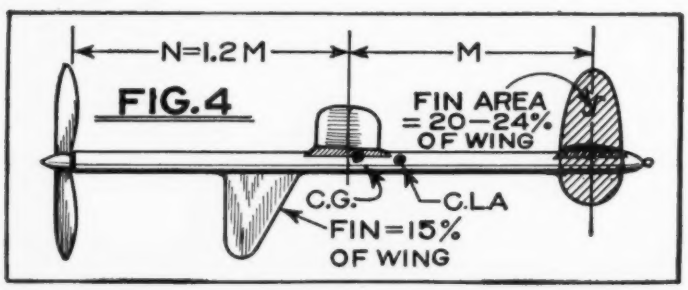


FIG. 2

PROPORTIONS DEVELOPED IN 1924 BY C.H.G.





THE backbone of model airplane activities is the small group of fans who are interested in using model planes primarily for scientific research. During the 1930's the great surge in activity sprang from the work of scientific modelers and continued in response to their leadership and their developments in design and construction. It was only when designs, structures and procedures became crystallized into a set pattern, and when the war robbed the model field of *scientific* leaders, that model aviation became somewhat demoralized and relegated to a playful hobby. Except for the bare nucleus of scientific builders who are again working quietly and without dramatics, model aviation is in a state of quiescence and at a point in its cycle of development similar to that which existed in 1931. Now, as then, the bulk of our young men are interested in the science of model aviation to some degree, but lack the knowledge of design that is necessary to create, build and fly models successfully—that is, with a great degree of precision.

The future of model aviation again rests upon the shoulders of the model plane scientists. If model aviation is to expand, the present generation of young men must be taught the basic principles of design by leaders throughout the country. These leaders must be leaders in fact and not name only. Their objective cannot be purely to exploit the model builder and measure his value in how much merchandise he will buy during the year. It is the leader's job to interest young men in and cultivate their knowledge of aviation. This can be done by allowing them to peek behind the scenes of this science so that they can begin to comprehend its magnitude and become intrigued by the many mysteries of flight still to be solved.

In this way leaders can appeal to and develop a serious scientific purpose in potential model fans. To merely sell him an airplane or parts without giving him an understanding of the science involved will capture him momentarily as a hobbyist without creating within him a serious interest in aviation itself. The degree to which some young men have been weaned from model aviation by model automobiles, railroads and flying gadgets at the end of strings is a very good example of this hobbyist outlook rather than a deep scientific interest in flight. All of this shows the general importance of design and the specific purpose of *Design Forum*. The cut and try method of many modelers may bring success — eventually — but knowledge of design will bring successful flying immediately and will create far greater interest in this sport generally.

One of these oldtimers of aero-science is Richard C. Grannis (9 N.W. Ninth St., Miami, Fla.). He was designing and building models 25 years ago and during all these years his interest has not flagged. Obviously this interest was scientific because it has endured. He is quite concerned about the loss in aerodynamic efficiency caused by excessive dihedral.

Many modelers in their overwhelming desire to capture stability use too much dihedral. They consider this a cure for all evils. Erroneously they believe that if enough dihedral is put into the wing it will cure all stability troubles without the necessity of wearing out their grey matter to determine accurately the cause of the trouble. In many cases this provides stability even though it often produces erratic flights. At least it prevents

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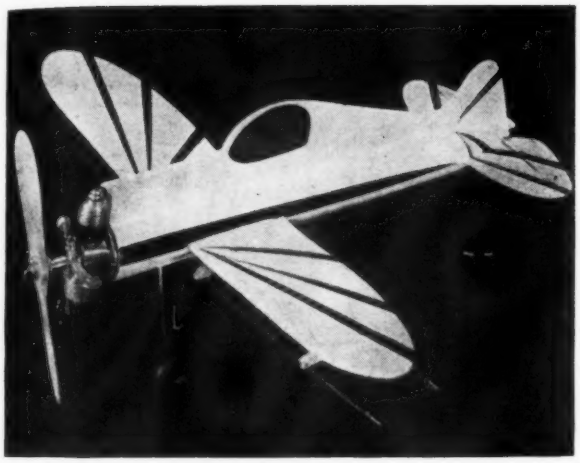


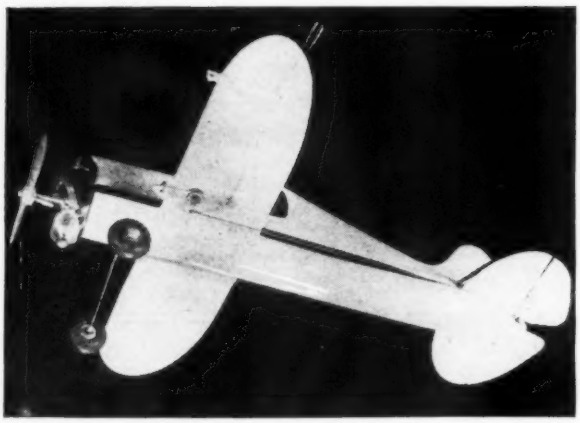
by Bill Winter

FORTY-NINER

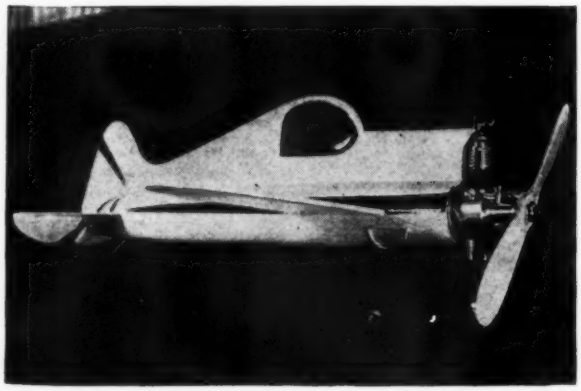
BECAUSE it has only .020 cu. in. displacement, the new K&B *Infant* engine makes possible a whole new field of model designs, one of which is the sport controliner, the semi-scale little brother of the "junior Goodyear" designs now being flown all over the country in bigger classes. Designed on the Goodyear racer motif, our *Forty-Niner*, has a number of interesting features.

First, it is a "square" design, having one foot wingspan and an overall length that matches. Made up entirely of sheet balsa, it is quite light in weight. With paint and engine the top weight should be approximately 2 oz.; it will be several tenths of an ounce less if you forego the colored dopes. With 18 ft. .014" dia. lines, the *Forty-Niner* has done 30 mph indoors. We strongly recommend using .008" lines for maximum performance.

Perhaps it would be interesting to know the origin of this airplane. When the *Infant* first appeared it was our thought that this engine should make it possible for the beginner to fly controline without any of the usual fuss or feathers. Why not build a trainer? The soundness of this idea was noted in the performance of the *Forty-Niner* indoors during the winter. Two beginner modelers who had never flown controline were briefed by Walt Schroder (who tossed the ship together) and both beginners managed the *Forty-Niner* successfully from the start, even though the ship had to pass over rows of folding chairs in the confined flying area.



A vest pocket controliner that seems ideal for beginners—bet oldtimers will fall for it, too!



Another good feature is the wide latitude the design leaves you for playing around with your own profiles. Note that the fuselage is built upon a balsa tube; the profile is cut from sheet and glued to the top of the tube. So you can alter this detail as you will, making any manner of Goodyear racer that comes to mind. Even a Vee-tail should make little difference.

CONSTRUCTION. The main part of the fuselage is the sheet-balsa boom which is formed from 1/16" thick stock. Select wood that offers little resistance to bending, and beware of wood that splits the instant you begin to curve it. It will be necessary to butt the joints of two pieces of sheet since 3" wide wood will not go all the way around the tube. Your best bet is to find some round object, a curtain pole, mop handle, etc. that provides approximately the diameter of the tube, then wet the sheet and form it around the tube. The wood can be held in position while drying by wrapping strips of cloth around the work. The plan clearly shows how the fuselage is built, the 1/8" sheet formers, the plug of balsa that fits into the tail, how the wing goes through, how the tail attaches.

For the fellows without a lathe, there is a simple way to make the tail plug. Remove the head from a No. 9 wood screw; use pliers to turn this wood screw into the rear center of the plug. Employ a knife to rough shape plug and then insert screw into chuck of your hand drill—have rear face of the plug flush with the jaws of the chuck when jaws are tightened over the screw.

Clamp your hand drill in a vise, leaving hand wheel free for use. Rotate hand wheel rapidly while holding coarse sandpaper against the plug—continue until the plug assumes proper shape.

The profile superstructure is cut out then covered with thin celluloid. Two number 2-56 x 1/4" R. H. machine screws fasten into two nuts glued to the rear of the 1/32" plywood firewall; this is detailed on the fuselage drawing. The landing gear is bent as shown from .030" wire, then glued to the bottom of the fuselage tube as seen on side view. The wheels on the original model were good looking but heavy, so it would be a good idea for the sake of flying to forego appearance. Use thin and light, but strong wheels.

The stabilizer and elevators are cut out from firm 1/16" thick sheet balsa. The size and location of the control pivot is shown on the side view, as is the bellcrank and pushrod, mounted externally under the wing.

The wing is cut to shape from soft 1/8" balsa. Sand the wood to an airfoil shape, rounded somewhat at the nose or leading edge and slightly pointed at the rear or trailing edge,

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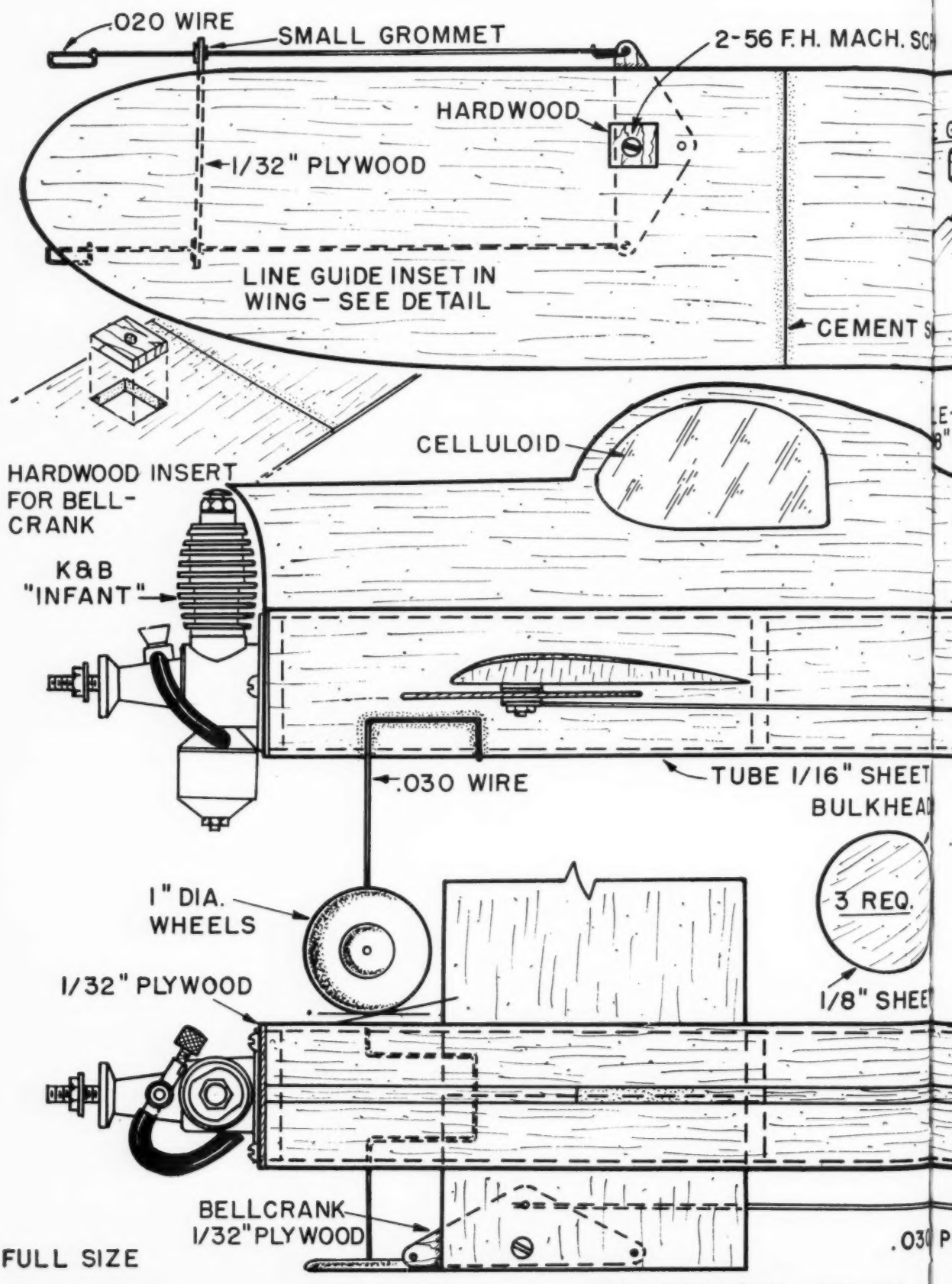
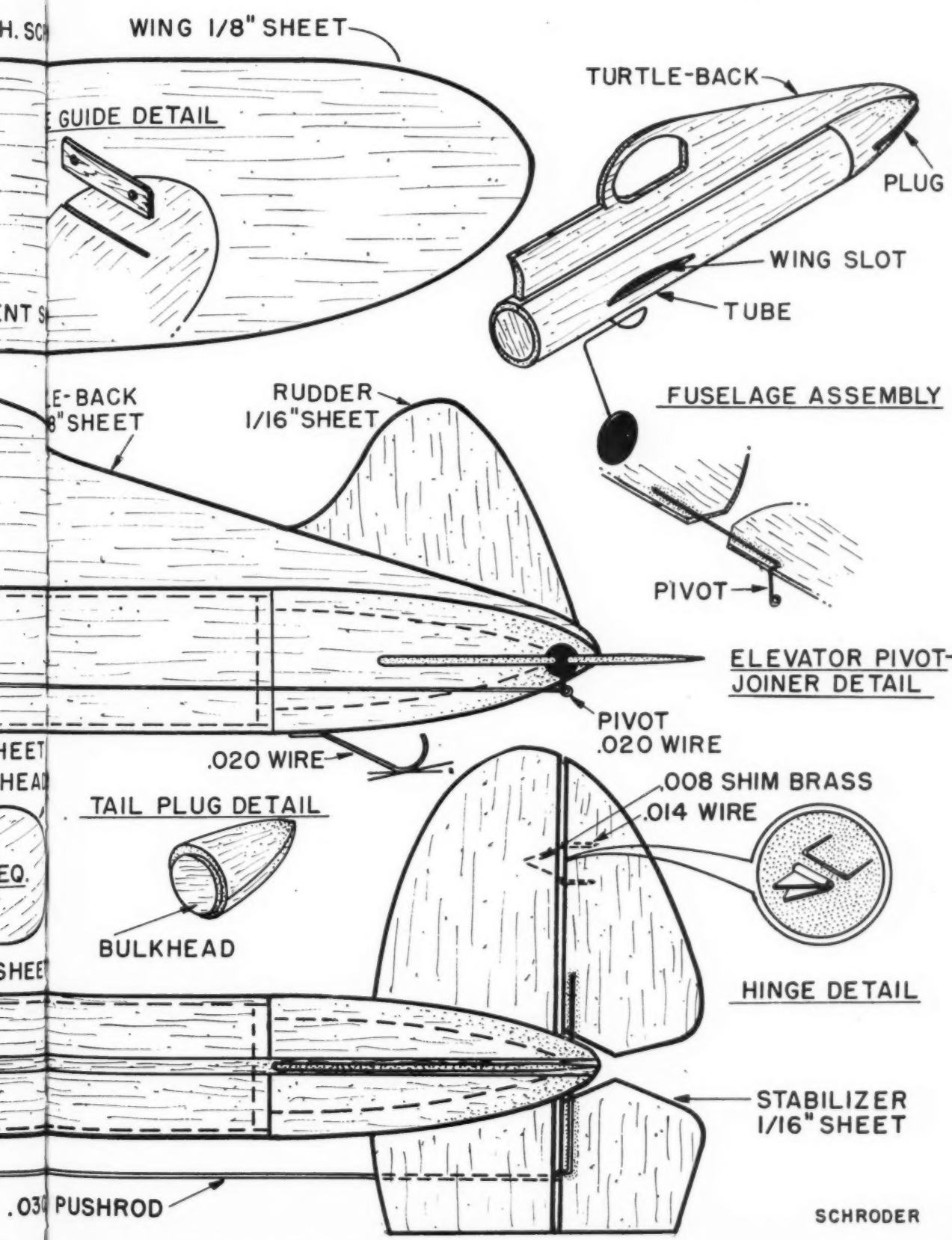
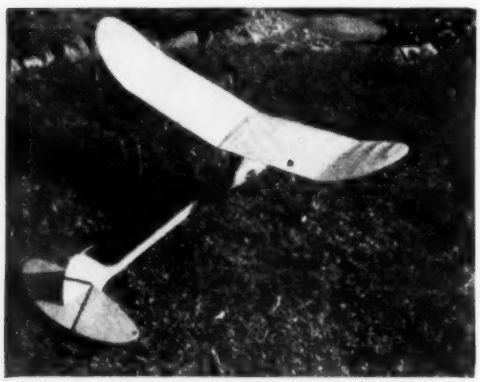

.020 WIRE
SMALL GROMMET
2-56 F.H. MACH. SC
HARDWOOD
1/32" PLYWOOD
LINE GUIDE INSET IN WING – SEE DETAIL
CEMENT S
CELLULOID
HARDWOOD INSERT FOR BELL-CRANK
K&B "INFANT"
.030 WIRE
TUBE 1/16" SHEET
BULKHEA
1" DIA. WHEELS
3 REQ.
1/32" PLYWOOD
1/8" SHEE
BELLCRANK 1/32" PLYWOOD
.03
FULL SIZE


WING 1/8" SHEET
GUIDE DETAIL
TURTLE-BACK
PLUG
WING SLOT
TUBE
FUSELAGE ASSEMBLY
RUDDER
1/16" SHEET
PIVOT
ELEVATOR PIVOT-
JOINER DETAIL
PIVOT
.020 WIRE
.020 WIRE
.008 SHIM BRASS
.014 WIRE
TAIL PLUG DETAIL
BULKHEAD
HINGE DETAIL
STABILIZER
1/16" SHEET
PUSHROD
SCHRODER

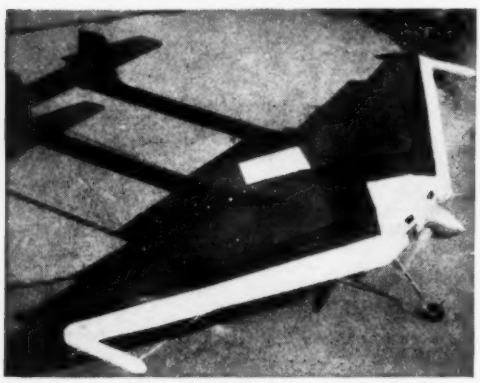
No. 1 *Aquabug*, a *Jetex*-powered flyingboat by H. Watkins

No. 2 Denton Birch with his *Go-Devil* which met a sad fate after a few good flights

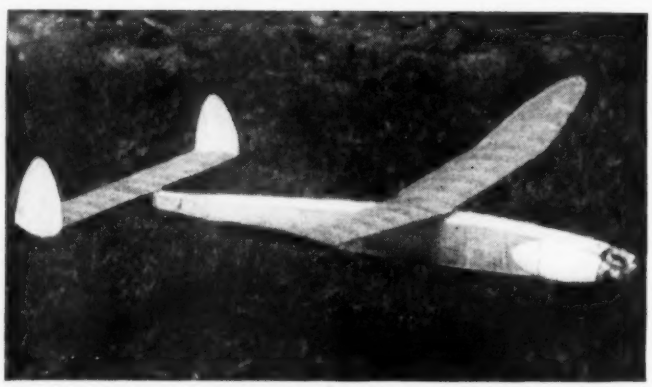


No. 3 Another *Skipper*, this one built by Paul Etchebarne

No. 4 Nonflying scale model of Jap *Betty* from Robert Mikesh has 13½" span



No. 5 A. Chadwick found this Burnelli-type quite satisfactory



No. 6 Modified *Wanderer* by Frank Le Donne which was built from M. A. N. plans

AIR WAYS

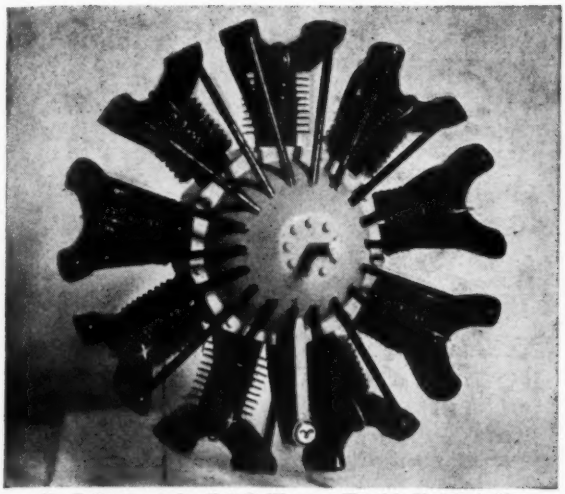
News of Model Airplane Experimenters from All Over the World

AMA IN 1948. A recent letter from Pres. C. O. Wright of AMA, and directed to all AMA officers, contained a summary of accomplishments for 1948, together with a number of objectives for 1949. We are sure "C. O." will not object if we detail a few of the more interesting items here.

Of top interest, of course, was the outstanding Nats held at Olathe. The Nationals is usually considered *the* AMA meet of the year, though of course it was actively sponsored last year by the American Legion, U. S. Navy, and the Olathe Chamber of Commerce.

In the line of meets, another success was chalked up in the re-establishment of the Wakefields, even though in this event the victorious English Team made off with the famed trophy.

Many active committees were established, and they



No. 7 Dummy engine that C. Warren will put in his latest ship

accomplished outstanding results. New by-laws were set up. a great deal of work was done by the insurance committee, increased dues were recommended by the finance committee to bring in more funds for an increase in AMA services. Not content with listing past accomplishments, the President presented quite a few 1949 objectives, several of which are:

1. A campaign for increased membership in all states and sections.
2. Completion of the insurance program started in 1948, to provide adequate coverage for every AMA member at low cost.
3. Provide fast service from headquarters on records, sanctions, reports, etc.
4. Produce the official publication "Model Aviation" on regular schedule.
5. Send a well-qualified Wakefield Team to England.
6. Provide field service by the headquarters staff.
7. Make certain the 1949 Nationals will top them all!
8. Work for greater safety, better sportsmanship, and improved public relations.

Since this program benefits all of us, let's get behind it and PUSH!

A DRIVE TO LIBERALIZE radio control regulations is another of C. O. Wright's objectives for '49. As he points out, the F.C.C., which governs all our radio activities, acts in the public interest. We must convince them that there is sufficient "public interest" in our ranks to work out a method whereby more moldelers can legally engage in radio control activity. Whether they designate a "radio control band," set up an examination—free license for control purposes, or however else the problem can be solved is up to the Commission. But they can't learn how much interest there is in this work unless YOU write them. Address your letters to the Secretary, Federal Communications Commission, Washington, D. C. At the same time, write your Senator and Congressman on the subject. The R. C. Committee has been in close touch with F C.C. officials on this, but there is nothing like a bunch of "letters from the people" to stir up action.

SPEAKING OF R. C., we want to give a few hints on how not to test your new radio job. Back in January, ye Editor was present when two model builders took out their pride and joy for first tests. The day was clear and cold, with a moderate breeze blowing. The model was a well-known and successful kit job and had just been completed. The owner, who was an experienced modeler, had installed a brand new motor, and neither ship nor motor had been flown. Since time was short, no ignition cutout timer had been installed.

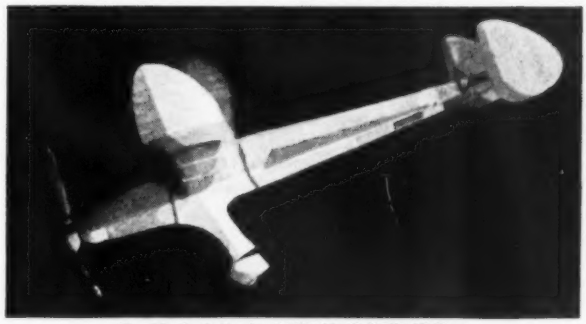
The motor started easily but refused to run at any speed less than wide open. When the receiver in the plane was turned on, the rudder of the plane kicked spasmodically, but a quick check with the transmitter seemed to show reasonable control. What next?

Well, time was short so the model was launched on its maiden voyage. The inevitable happened. The little ship roared upward, and by the time the fuel load ran out it was quite a distance from the field and traveling rapidly downwind. Radio control had no effect. It disappeared in a heavy woods and was luckily spotted an hour later perched (aren't they always!) in the topmost branches of a very

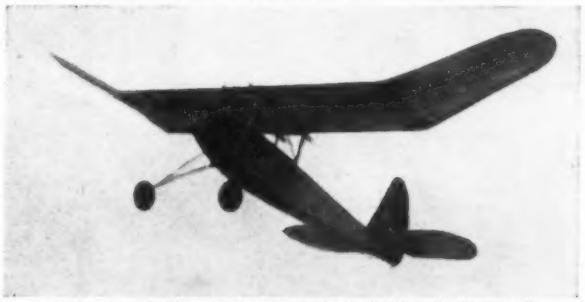
(*Turn to page* 50)

No. 8 Neat *Dyna-Jet* installation in Capt. F. Smith's controliner

No. 9 *Pfalz* D 12 scale flier by Frank Beatty is stunt ship

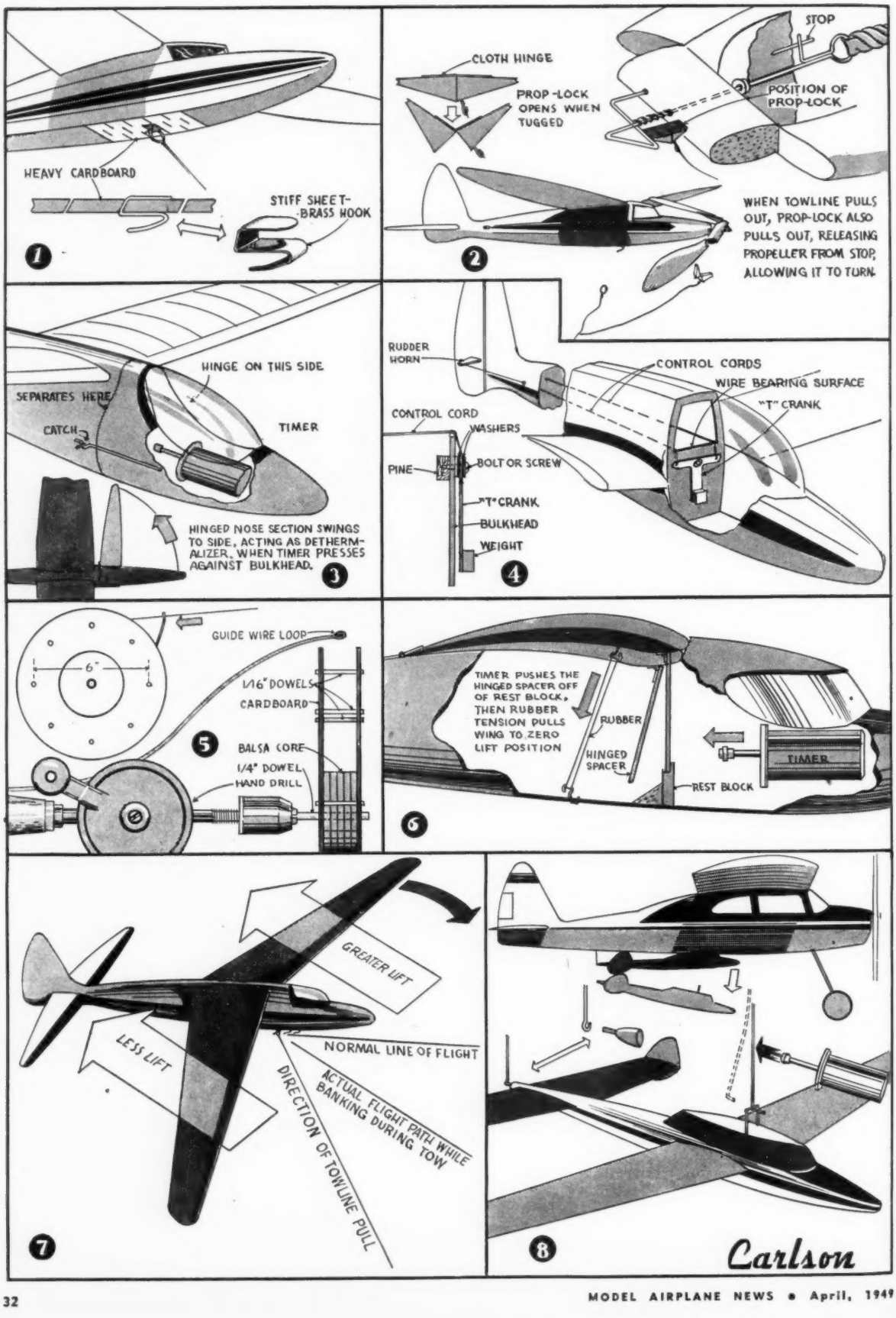


No. 10 Jack Hegley built this *Valhalla Visitor*



No. 11 A real oldie! Ancient Lanzo design built by V. M. Tyrrell

No. 12 Austin Hofmeister powers this 22 incher with *Kalper* diesel


HEAVY CARDBOARD
STIFF SHEET-BRASS HOOK
1
CLOTH HINGE
PROP-LOCK OPENS WHEN TUGGED
STOP
POSITION OF PROP-LOCK
WHEN TOWLINE PULLS OUT, PROP-LOCK ALSO PULLS OUT, RELEASING PROPELLER FROM STOP, ALLOWING IT TO TURN.
2
HINGE ON THIS SIDE
SEPARATES HERE
CATCH
TIMER
HINGED NOSE SECTION SWINGS TO SIDE, ACTING AS DETHERM-ALIZER, WHEN TIMER PRESSES AGAINST BULKHEAD.
3
RUDDER HORN
CONTROL CORDS
WIRE BEARING SURFACE
"T" CRANK
CONTROL CORD
WASHERS
PINE
BOLT OR SCREW
"T" CRANK
BULKHEAD
WEIGHT
4
GUIDE WIRE LOOP
6"
1/16" DOWELS
CARDBOARD
5
BALSA CORE
1/4" DOWEL
HAND DRILL
TIMER PUSHES THE HINGED SPACER OFF OF REST BLOCK, THEN RUBBER TENSION PULLS WING TO ZERO LIFT POSITION
RUBBER
HINGED SPACER
TIMER
REST BLOCK
6
GREATER LIFT
LESS LIFT
NORMAL LINE OF FLIGHT
ACTUAL FLIGHT PATH WHILE BANKING DURING TOW
DIRECTION OF TOWLINE PULL
7
8
Carlson

GLIDER GADGETS

by NOBLE D. CARLSON

MOST modellers are by nature gadgeteers of the first order, and in all of modelling there is no more opportunity (or room) for gadgets than inside a glider.

Here's a batch of glider gadgets and ideas which have been tested, simplified, and which work! Where timers are referred to, the *Austin* timer may be used with extension, while the *Arden* timer may be used as is.

Starting with No. 1: A quick means of finding the most effective towhook position. It is a sheet of strong cardboard or balsa, forming the fuselage floor, which is slit at intervals about the approximate towhook position. An S hook of stiff sheet brass fits into these slots and is readily changeable. Make slits to the left and right, as well as along the fuselage centerline so that any tendency of the glider to turn while being towed may be partially corrected by moving the hook toward the inside of the turn. When the best position is found, cement the hook in place.

No. 2 is a gadget which makes it possible to fly out of sight that everlasting home loving rubber model that never wanted to leave the ground. It allows you to lock the folding prop, after the rubber has been wound, and tow the model up glider-wise. The gadget pulls out when the towhook drops away, allowing the prop to rev, and giving your model the advantage of a very high start—just like flying it off a high roof. It consists of two wooden pieces connected by a cloth hinge. It is made a bit oversize, then trimmed so that when locked in the "open" position it engages the tensioner of the folding prop, closing it against the stop, and locking the prop blades so that when towed they fit close about the rubber model's fuselage. When the model is at the peak of the tow, and the towline releases, it folds the gadget pulling it out and thereby allows the propeller to revolve. Make it of two pieces of rather hard wood connected by a cloth hinge, then whittle down to fit in place. Be sure to add small slivers of wood between the two facing surfaces, so that when a slight tug is exerted the device readily folds. The lock is connected to the towline, but don't leave enough slack in the extension to foul in the towhook.

No. 3 is an extremely effective dethermalizer which consists of a swinging nose section, held in place by a catch, permitting the nose to swing open at a predetermined time, actuated by a timer. The timer is fastened inside the swinging nose and pushes against the rest of the fuselage to uncatch. Its effectiveness is due to several things: it swings the weight of the nose backward, to the side; provides more drag on the heavy side; and spoils some of the lift of the wing on the heavy side. It may be necessary to help the swinging action by use of a small piece of stretched rubber, which pulls the nose aside when uncatched. It is one of the lightest dethermalizers possible, requiring only the added weight of the timer, catch and hinge.

No. 4 is a pendulum arrangement which automatically swings the rudder to the right if the glider veers to the left (and vice versa) while being towed, thereby heading the glider back onto its straight and climbing path. It acts in the same way when the glider is free of the towline, serving to keep the glider on an even keel, avoiding altitude losing turns. It is not a new idea but has been considerably simplified—and it is dependable. The rudder horns should be immediately behind the fin-rudder joint, and each horn should be as long as each side arm of the T crank. From then on, trial and error is the most effective way of adjustment. Move the connecting thread outward on the rudder horn for less quick response, and inward for more response. If too effective it will prevent the glider from circling in a thermal. If insufficient response is forthcoming, add weight to the pendulum.

No. 5 is a winch-tow which is an improvement over running with the towline, and superior to the elastic tow because it allows positive control at all times over the towing speed and over the moment of release. It is made of a simple cardboard drum, with a shaft which fits into the chuck of an ordinary hand drill. When very small gliders are being towed it is also superior to the elastic tow, which is sometimes too heavy with the weight of the rubber and too sluggish near the end of the tow to take the glider to maximum altitude. Construction is explained fully in the drawing. Wood screws which pass through small loops in the shaft of the guide wire hold it to the handle of the hand drill. For a drill with 3 to 1 gearing ratio, the 6" reel diameter will be sufficient. A larger reel is called for if the glider to be towed is a naturally fast flier.

No. 6 is a reliable dethermalizer which can be adjusted for different rates of descent because it works by destroying the lift of the glider by decreasing the incidence of the wing at the predetermined time. The drawing is self-explanatory. When trying it out for the first time, decrease the incidence a little at a time, or a whistling vertical dive may result.

No. 7 is not a gadget but is another method of "automatically piloting" a glider of a certain type. Two forces shown are those that act on a glider which banks during the tow; the glider's natural tendency to follow its own line of flight and the pull exerted by the towline. The result is a skid. If the wings of the glider are swept forward, the result during a bank is that the wing nearest the towing point edges into the "relative wind", while the far wing presents itself at more of a right angle, producing more lift and banking the glider back onto its normal course straight over the towing point. Once the glider is free of the towline,

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Design Forum

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crashes. On the other hand a terrific toll is paid in efficiency.

Mr. Grannis understands correctly that a dihedral of more than 10 degrees is accompanied by great loss of lift and efficiency. So if you wish to get the most out of your model the dihedral should not be greater than this. Approximately, 10° is equivalent to a rise on *each* wingtip, measured from midpoint of the wing chord at the wing center, of 1" for every 12" of span or for every 6" of "half-span." Fig. 1 shows a dihedral of 8.75°. Many models have been flown with perfect stability and great steadiness which used only half this amount of dihedral. A dihedral of 7/8" tip rise for every foot of span, or 8.75°, is recommended. This gives stability without great loss of efficiency —provided other related factors are properly proportioned.

The first consideration is fin size relative to the dihedral, because if it is too large compared to the dihedral, especially when there is little vertical side area close to the CG, the model will be spirally unstable. It will have a tendency in turns to "nose in." For any given fin size it is essential that enough vertical side area be provided at the forward part of the airplane so that the nose will not drop quickly when the plane banks while turning. The *relative* amount of vertical area forward and at the tail determines the degree to which the nose will drop.

Now we come to the reason why many modelers increase the dihedral promiscuously. This provides more forward side area and helps overcome the effect of excessive fin area. On the other hand, and in spite of this nosing-in effect, some models require very large fins to keep them *directionally stable* and steady; this often causes the nose to drop quickly into a dive or spiral; the only cure in such cases is to add *more vertical area forward*. You can obtain this forward area by increasing the dihedral but you obtain an objectionable loss in efficiency. It is better to keep the dihedral at 8 1/2° to 9° and add vertical fin area *at the CG*.

Pylon models are an excellent example of this procedure. The pylon at the CG provides the needed vertical side area. The only trouble with this is that the area is often placed in the wrong position. Instead of being above the CG it should be placed so that the center of side area is not raised but lowered. The area usually should be placed below the CG to compensate for the side area of the dihedral which is above the CG, Fig. 2. This tends to centralize all side forces which cause rotation and disturbance in flight, and results in a steadier, more stable flight with greater aerodynamic efficiency as well as stability. We might outline the procedure as follows:

(1) Set your wing at the correct dihedral (7/8" for every foot of span).

(2) Establish the amount of area for the fin that will be sufficient to keep the plane directionally steady in flight without allowing the tail to swing from side to side. A formula which gives the correct fin area in 95% of the cases is as follows:

For rubber powered models, fin area

$$= F = (.5)\ \frac{A\ (S + \frac{6N}{M}\ \sqrt{DP})}{M^2},$$

For gas models, fin area

$$= F = (.3)\ \frac{A\ (S + \frac{30N}{M}\ \sqrt{DP})}{M^2}.$$

In the formula, F equals required fin area; A wing area; S the span; D propeller diameter; P propeller pitch; N the distance between wing center and rear face of propeller hub; M the distance between wing center and fin center; Fig. 2 and 3. This formula naturally applies only to tractor planes.

(3) Add vertical side area at approximately the CG sufficient to move the center of lateral area forward to a point which is not more than 18% of distance M, Fig. 2, rearward of the CG. In other words, if the moment arm M is 25", the distance between the CG and CLA should be not greater than 4 1/2". If greater, for instance 7" or 8", the nose will have a decided tendency to drop and the plane to dive in on turns.

Many readers have asked how to find the CG and CLA. To find the CG before the plane is constructed is a difficult problem and worthy of an experienced engineer, although after the plane is built it is a simple matter and has been explained in a previous issue (March 1948).

The CLA is determined by cutting out an exact silhouette pattern of the side view of your airplane. Cardboard is one of the best materials to use. However, an extra thickness of cardboard must be cemented to that part of the pattern representing the wing because there are two dihedraled wingtips, each providing side area. Any other parts which have double side area, such as two wheels, two fins, etc. must be represented by double thickness on the cardboard silhouette. The point of balance of this cardboard silhouette is the CLA. This can be determined by balancing the silhouette on the point of a pin, changing the position of the pin until the cardboard remains in a balanced horizontal position.

Mr. Grannis also brings up another interesting point, and one which not only has a bearing on efficiency but also on stability. This factor is the effect of different propeller pitches on any given model. Mr. Grannis says for instance, "On one stick model I kept changing props (and rubber motors). The higher the pitch the lower the angle of climb resulting, but the greater was the actual altitude reached. I went from 16" diam. 16" pitch to 16" diam. 21" pitch and finally to 24" pitch. Here the model flew very realistically but was erratic at times for no known reason."

We believe we know the cause to this change in the type of flight. With the lower pitches, 16" and 21", the blade area was sufficient to provide a comparatively low blade angle of attack, even while climbing steeply. In other words, for the pitch of these props there was sufficient blade area to prevent excessive prop slip or "churning," when the plane climbed at its maximum angle. However, when the 24" pitch was used this amount of blade area was insufficient, because as the pitch increases the blade area also must be increased if churning is not to result.

Churning in itself is not important, but sometimes it does cause the model to fly erratically while climbing. Obviously, when a propeller slips or churns the blade passes through the air at a very high angle of attack, sometimes even at stalling angles. Consequently the drag of the prop blades is increased many times and therefore the prop torque is increased because the torque is proportional to the drag of the prop blades. Now, it is obvious that with excessive torque there

(*Turn to page 36*)

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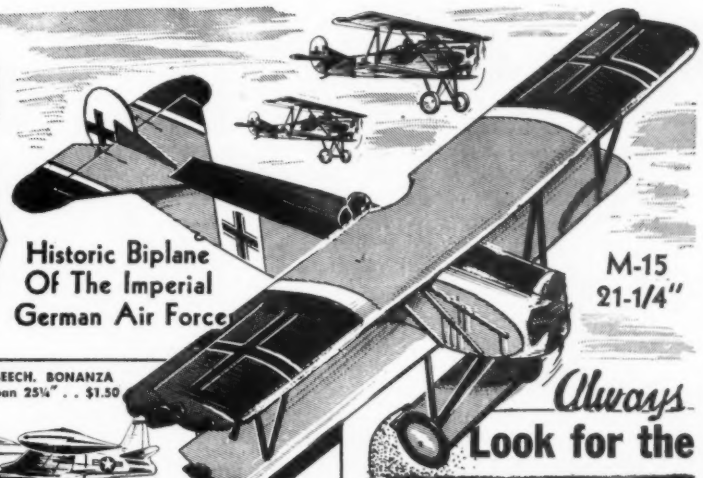
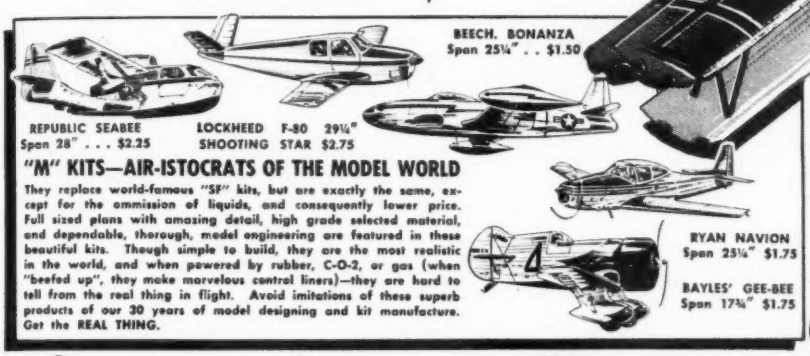


Historic Biplane Of The Imperial German Air Force

M-15 21-1/4"



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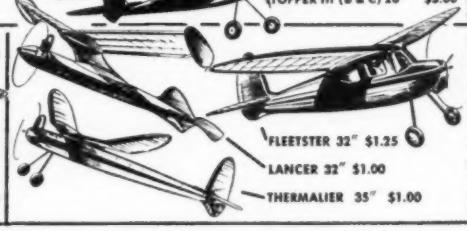

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will be an excessive tendency for the plane to bank in the opposite direction from propeller rotation and for the tail to swing sharply to the left. This is the flight reaction caused by excessive torque.

Mr. Grannis's model evidently was erratic when, during climb, the torque became excessive. We would guess that the model leaned a little to the left and then spun to the right about its vertical axis. This is the reaction of this condition on long nosed contest stick models. In some cases this type of model has been known to spin completely around in a horizontal plane through more than 180° without losing its lateral or longitudinal balance. In other words it turns perfectly about its vertical axis.

This will happen also in many cases even though the prop blade area is sufficiently large compared to the prop pitch. In this case the erratic action is produced by the effect of the large projected side area of the propeller located at the end of the long nose of the airplane. The longer the plane's nose the greater will be the effect of this side area and the prop torque, and the greater the tendency will be to swing about the vertical axis. This condition is corrected by:

(1) Reducing the diameter and/or pitch of the propeller.

(2) Enlarging the fin to balance the side area of the propeller forward of the CG, Fig. 4. (The fin area should be about 20% of the wing area or more on contest stick models. The exact area is given by the fin formula.)

(3) Add a vertical fin beneath the thrust line and slightly forward of the wing. These two vertical surfaces will tend to keep the model flying straight or in a definite curved path and will dampen out many erratic maneuvers.

To make certain your plane will fly correctly, it is best to check the CLA position as indicated in Figs. 2 and 4. In other words, lack of care in locating the CLA relative to the CG and not providing the proper fin area has probably caused Mr. Grannis's difficulty. It is definitely known to cause many of the erratic flight maneuvers common to long-nose stick models.

Sometimes the large propeller (diameter or pitch) also causes excessive stalling tendencies which is overcome only by a larger stabilizer. Minimum stabilizer area for these conditions as well as for ordinary conditions is given by the following formula. Symbols A, P, D, N and M represent the same factors as in the formula for fin area. Symbol C equals wing chord, and As stabilizer area. Minimum stabilizer area for rubber powered

$$\text{models} = \text{As} = (9.2)\ \frac{\text{A}\ (\text{C} + \frac{\text{N}}{\text{M}}\sqrt{\text{DP}})}{\text{M}^2}$$

For gas models use the same formula except change quantity $\left(\frac{\text{N}}{\text{M}}\right)$ to $\left(\frac{4\text{N}}{\text{M}}\right)$.

When cambered stabilizers are used, multiply the answer for As given by the above formulas by .8. This gives the *minimum* cambered stabilizer area required.

* *

Many of the answers given in *Design Forum* have been questioned by students of full scale aerodynamics. Often they feel there is a discrepancy between what they have learned about full scale airplanes and what we say about models. A pertinent example is the comments on wing sections suitable for models. In most cases this difference is due to considerations of scale effect. For instance, for a high speed full scale airplane an entirely different wing section is required than on a slow speed model because the air reacts differently on wings at slow speed. In respect to this we wish to warn Mr. Grannis. He says: "I intend to try out some of the new fangled laminar flow wing sections on page 22 of the January issue. These should provide the means for many interesting experiments." We wish to call to your attention that these wing sections were designed for very high speed and not for low speed. It will be interesting if Mr. Grannis will let us know of his results when these sections are used on low speed models.

A valuable source of information that may be applied to models is the *Handbook of Modern Aeronautics* by Arthur W. Judge (available in most libraries). Though published many years ago it gives data based on results obtained at comparatively low airplane speeds. It covers all phases of wing reactions at different angles of attack, different aspect ratios, cambers, wing sections, etc.

Also, when you have a model plane problem we suggest that you refer to *Model Airplane Design* by Charles H. Grant, which answers questions pertaining especially to models.

Material Matters

(*Continued from page* 15)

In general the materials suggested can be used for miniature operating mechanism.

A scale model that can be disassembled has just a bit more authenticity than one cemented solidly into a single unit. Further, it is easier to maintain or transport. If the design is a biplane, the problem of disassembly is necessarily complex. Wing attachment fittings, strut fittings, and the method of attaching rigging wires must be planned both for realism and use, while the control system must be so built that it can be disconnected. Inspection cover plates, used in the same way as on the actual airplane, can provide access to fittings or internal parts to be disconnected.

In models designed to be taken apart a very useful item is the jeweler's machine screw. These are manufactured in many sizes and types and actually are miniature bolts. In the model illustrated, wide use was made of the 1/32 diam. oval head brass type. Supply houses for jewelers or opticians usually have these at a reasonable price. They are sufficiently hard to permit their use in cutting threads in sheet brass fittings. The control system, engine, cowling, canopy, struts, and various other parts on the model photographed are "bolted" using these screws in threaded brass fittings.

Although scale model types and sizes vary widely, the materials mentioned are useful in the majority of models. The best source of ideas for different materials or new uses for the usual materials is the model's prototype. Scale requirements usually prohibit using the same material found on the full size airplane but a knowledge of the airplane's features usually suggests substitutions. Thus silk is ordinarily used to simulate aircraft fabric, aluminum or brass sheet to model a duralumin fitting, or tinned wire worked to an oval section to copy streamlined rigging. The different ways in which any material may be used depend partly on the airplane being modeled, but principally on the builder's ingenuity. Here, as in all scale model work, accuracy, realism and durability are the determing factors.

Team Racing

(*Continued from page* 11)

makers. These look like real full size racers, and instead of racing against a stop watch they race against each other."

I imagine some of the speed merchants are completely burnt up with this new form of "speed" flying. Don't get me wrong fellas—I have clung for dear life to that old pylon at many a meet. Come on into our new circle—competition soon will be keen. Give it a try, huh!

F.A.S.T. Club Rules and Specifications

MODEL SPECIFICATIONS. A Team Racer does not have to be a scale model. However, the design should follow that of real racing or sport type airplanes such as the Thompson, Greve, and Goodyear Racers. Model must have a full length fuselage, rudder or butterfly tail, spinner, and a cockpit or cabin. No pod, boom, or flush type cockpit designs allowed, unless model is an actual scale model of a real aircraft employing such features. Cockpit or cabin must be in proportion to those on full scale aircraft, and must contain a dummy pilot's head.

Engine must be completely cowled. However, if the builder wishes the spark-plug porcelain or its equivalent may be allowed to protrude.

Landing gear must be fixed or retractable (no dollies). Wheels must lower for all landings if of retractable type. There shall be a tail skid (no wheel), ending in a loop suitable for use with a takeoff release device.

Minimum effective wing area shall be 125 sq. in.

Engine displacement shall be between .20 and .30 cu. in.

Fuel tank shall hold a maximum of 1 fluid oz.

No metal props shall be allowed.

All Team Racers shall have a means of engine shut-off in flight.

Flying lines shall be 60′ in length, .001″ dia. for each 3 oz. of model weight, .010″ dia. minimum, and withstand a 20G pull.

All Team Racers shall be flown in a counter-clockwise direction.

Team Racers must be colorfully painted and have a large numeral on each side of fuselage. Model shall also have a license number on right wing and on rudder. This number could be your AMA number prefixed by an NX or NR. All these construction and finish details are aimed at creating an attractive and realistic miniature racing airplane.

* *

Suggested Contest and Flying Rules

1. Using a common center, 3 circles shall be marked at 10′, 60′, and 70′ radius. In the center of the circles shall be a pylon, post, or other object around which all pilots must walk. The 60′ circle is the flying radius of the racers. The 70′ circle is for landing and taking off. The 10′ circle is for the pilots' guidance.

2. Takeoff releases (automatic stooges) shall be provided for 6 models. These shall be equally spaced to the rear and the side of each other so as to provide sufficient clearance between models. All release pins should be connected to one master handle so that the starting judge can either release all models at one time or at split second intervals depending on the skill of the pilots and length of the race. After refueling, each helper releases his own model.

3. A marked waiting lane for 6 models shall be provided adjacent to the flying circle, so that while one race is in process another group of models can be readied.

4. Pits should be provided in a place

where the spectators can get a close look at all racers without being able to interfere.

5. A starting judge, recorder, announcer, and 6 lap counting judges shall be provided.

6. For establishing records and for spectator interest a stop watch shall be provided to clock the winning model of each race and compute its speed.

7. After all racers are in the circle for a race, engines must be started and ships ready for flight within two minutes. Fuel may be added to the tank at any time up to the moment of release. A starter may be used to start engines if desired. Any number of models may fly in a race. After the required distance has been flown, all engines will be shut off as soon as possible and the circle cleared for the next race. Time for a race shall be from moment of release to completion of the required distance including time for refueling.

8. If maximum altitude of any ship exceeds 30' during a race, that lap will not be counted.

9. Any attempt by the pilot to whip or lead his model will disqualify him from that race.

10. To qualify a Team Racer for a contest a pilot must: (a) Have model judged to see that it meets all construction and finish requirements. (b) Make a 20G Pull Test. (c) Make a qualifying run to demonstrate his ability and the model's stability. This run shall be a level flight of not less than 1/2 mile nor more than 1 mile.

11. One pilot and 1 or 2 crew members shall constitute a Team.

12. Each Team can enter as many models in the contest as desired. Naturally only one of these can compete in a given race at a time.

13. Interchanging of motor or tank units is permissible during a race.

14. It is suggested that records be established for 1/2, 5, and 10 mile races.

15. Fuel tank will be measured whenever a model sets a record, or at any time a judge deems it advisable. An oversize tank will nullify any races or records made with it.

16. EVENTS:

1/2 mile Acceleration Dashes. Open to any Team Racer that qualifies. As many dashes as desired may be run. Points award: 10 for 1st, 7 for 2nd, 4 for 3rd, and 1 for 4th. Models will be listed according to accumulated points.

5 mile Consolation Race. Open to models from 7 to 12 in. point standing.

10 mile Feature Race. Open to models 1 to 6 in. point standing.

17. AWARDS:

1st, 2nd, 3rd, 4th place winners in Consolation Race.

1st, 2nd, 3rd, 4th place winners in Feature Race.

Best Appearing Team Racer.

Highest Speed in an acceleration dash.

* *

Construction of Chatterbox

FUSELAGE. This is constructed in two halves in the usual block-type manner. Use a hard balsa block for the bottom and medium hard for the top. Begin by spot-gluing these two blocks together. Rough cut to side and top view outlines. Next carefully cut top view of fuselage to final dimensions. Split blocks apart and cut in the motor mount runners after making sure your engine will fit the available space. Place fuselage back together by light spot-gluing. Start forming fuselage with a plane, followed by rough sandpaper. Use bulkhead patterns to insure accuracy of contours. Inlay plywood piece in position for mounting landing gear. Take halves apart again and hollow out to thickness as shown on station contour templates. Glue hold-down crossbars in place. Cut holes as indicated for intake, exhaust, and heat vents.

WING. This is constructed from two pieces of 1/2" x 3" sheet balsa glued together. Cut to wing contour. Form airfoil into sheet, using root and tip templates to get an average airfoil on each panel. Cut wing in half, set 1/2" of dihedral at each tip, and glue together. For strength place a piece of silk over center joint and saturate with more glue. Glue two pieces of 1/6" plywood in place, one on top and the other on bottom, for mounting bellcrank. Cut wire lead-out guide from 1/8" plywood and glue in position.

TAIL ASSEMBLY. "V" type tail is constructed of 3/16" hard balsa. Form symmetrical airfoil in this assembly, as this will insure more positive control. Cut in half and glue together after having checked 120 degree arc between the two fins. Cut rudder-vator from side designated on plans; install on stabilizer with hinge. The hinge is made from 2 pieces of linen 1/2" wide and 5-1/4" long, sewn together down the center. Glue hinge in place and solder control horn in place. Install control cable of 1/16" piano wire between control horn and bell crank.

FINAL CONSTRUCTION. Assemble all parts, being sure there is 0 degree incidence in both wing and V-tail assembly. Make sure that motor has neither right nor left, positive or negative thrust.

Canopy is formed from 1/32" celluloid over 1/16" soft wire frame. Cockpit de-

tails are optional. However, an hour can be well spent in putting on final touches such as dashboard, stick, pedals, seat, and the all important dummy pilot. If you don't wish to put in all the dressing, settle for a minimum of the dummy pilot; he will do the trick for your little ship in flight.

FINISH. All surfaces should be filled and sprayed with synthetic enamel (Apply decals as suggested by plans).

FLYING. Use a mild glo plug fuel. Test fly using a 8-9 *X-cell* prop if a K&B *Torpedo* is used for power, as in the original ship. Balance nose heavy, balance point should be 1" behind leading edge of wing. From here, you're on your own. See you at the races!

CO2 Tachometer

(*Continued from page* 13)

Make a paper dial, copied from the one on the drawing. Stick this on one side, making sure the numbers register with the correct wires.

The final job—trimming the wires to length—must be carefully done, for upon it depends the instrument's accuracy. Use an engineer's steel ruler, preferably graduated in hundredths, for measuring; for removing the last few thousands of an inch, a small grinder is the best tool.

OPERATION. To make the fullest use of your tachometer, adopt the following procedure. Have an assistant equipped with a watch (a stop-watch is best), pencil and paper. Ask him to write down the numbers 7500, 7000, 6500 . . . . . 1500. Hold the tachometer against the motor mount and start the motor. As each reed vibrates, call out the rpm, and against this number your assistant will write down the time, in seconds, from the beginning of the motor run. In this way you will obtain a set of readings from which a graph, similar to the one shown here, can be plotted. From the graph, you can arrive at the average rpm which we shall call N. You already know the motor run—call this T seconds. Now, if E is the Energy, or work done by the motor, it is true to say that

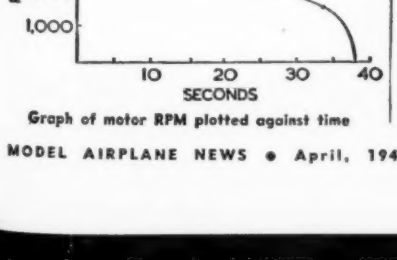
$$E = K N^3 T$$

K is a constant, which depends upon the propeller. Thus, provided that one propeller is used, different motors and different settings of the same motor can be compared by seeing which gives the highest value of N^3 T. To show how this works in practice, take our sample graph. N, the average rpm, is 2660 and T is 38 seconds.

Therefore $N^3 T = 2{,}660^3 \times 38$

$= 72 \times 10^{10}$

Now, we found that if we warmed the cartridge, by holding it in the hand for a few minutes, this figure could be raised to 101×10^{10}. This proved conclusively that, in this case, hand warming the cartridge increased the energy released by about 40%.



Graph of motor RPM plotted against time

World War 1

(*Continued from page* 19)

designers were still experimenting with bird-shaped wings, multiple engines, chains, driveshafts and automatic stability devices, Roe had been simplifying his airplane, generally cleaning it up and making it practical. The resulting model 504 appeared in 1913 as an 80 hp two-seater, and it can safely be said that this airplane was the granddaddy of the modern biplane, which seems now to have passed out of the picture with the PT-17, in America at least.

Before the end of 1913, several *Avro 504s* had taken to the air and began setting up a remarkable series of successful flights. One of these early models was purchased by the *Daily Mail*, fitted with floats and used for exhibition flights at various coastal towns in England.

When the First World War began, the *Avro 504* was probably the most thoroughly tested privately built airplane in England. The British Army and later the Royal Flying Corps were principally equipped with government designed aircraft such as the B. E. and F. E. types, at the beginning of hostilities. But with the need for rapid acquisition of aircraft of known ability, the government placed large orders for the *504*, and commandeered existing examples for immediate military service.

By the end of 1914 several score *504s* had been produced, not only by the Avro firm but by other manufacturing contractors. By that time the original *504* model had been produced in A, B, C and D sub-types, all identical dimensionally and with the same type 80 hp *Gnome* engine but internally outfitted for different purposes. Types A and B were two seaters of the general utility type and were called upon for an amazing number of duties. Types C and D, however, were outfitted as single seaters and were equipped with external bomb racks.

Imagine going into battle in an airplane with approximately the same speed and weight of a Cub! That's exactly what they did with the *Avro 504*! On February 12, 1915 a group of 34 British planes, several of them *Avro 504 C* and *D* models, took off from Dunkirk, in France to raid Ostend, Belgium, then in the hands of the Germans. Each plane carried a light load of bombs, but the raid was a success and will go down in history as one of the first mass raids against a military objective.

About the same time, Germany was sending her Zeppelins on bombing forays against England and northern France. The English retaliated quickly, with the single seat *Avro 504s* outfitted with bombs. Their objective, on more than one raid, was Friedrichshafen, Germany, home of the Zeppelin works. The raids served the purpose if only for nuisance value.

Raids by the *504* didn't stop the Zepps altogether, so the rugged little *Avro*, in a few instances, was fitted with a center-section-mounted Lewis machine gun. Thus armed, it served admirably during the first few months of Zeppelin raids on England, until replaced by more practical types for the purpose of interception. The *504* did some good work, however, and will never be forgotten as one of the earliest of combat airplanes.

Retired from shooting phases of the war, the *Avro 504* was to find new opportunity to prove itself as a primary training machine, comparable to the U. S. Curtiss *Jenny*. In its new role the *504* was beginning to both replace and augment training operations conducted on the Farman "Rumpty," a primitive French pusher which the English had acquired in great numbers for instructional purposes.

At first the *504* was used in the second phase of flight training—after a student had soloed on a "Rumpty." Later, however, the *504* came into its own as the standard R.F.C. (later R.A.F.) primary trainer. As such it made history in one respect—it was the first trainer to be equipped with a communicating device between pilot and student. This was a speaking tube affair, somewhat like a physician's stethoscope through which the instructor's commands were audible. This, the Gosport System, replaced throttling the motor and yelling instructions, or the arm signals used in the earliest days. The effect of a calm, if not too clear voice of the instructor made all the difference in the world in the student's ability to learn to fly. The Gosport system was inevitable, but the *Avro 504* had the honor of being the first high production airplane in which it was incorporated.

It would indeed be difficult to flatly claim that the *504* was honestly the best training airplane of World War I, but it can be said that, in spite of its rotary engine, the *504* was tied for first place with whatever trainer anyone else could name. In the course of development the basic *Avro 504* and *504A* through *D* (there is no record of a *504I*) and models *G* and *H* were powered by the original basic powerplant, the 80 hp *Gnome*. Models E

and J carried the 100 hp *Gnome*, while model *F* was powered by the 75 hp Rolls Royce *Hawk* (sometimes rated at 100 hp).

The crowning glory, so to speak, of the *504* series was model *504K*, the model usually referred to when *Avro* W. W. I trainers are mentioned. Model *K* was the result of detail refinement on a basic design. Actually, through all these model changes which were principally brought about by engine changes, the *504* dimensions were not altered. It was in the method of suspending the engine, the makeup of cowl pieces, rigging and cockpit appointments that made the letter-type changes. So in discussing model *504K* in some detail we can accurately cover the entire line.

Model *K* was the last of the line, as far as W. W. I production is concerned. It was powered by either one of four engines, the 100 hp *Gnome*, 110 *le Rhone*, 110 or 130 hp *Clerget*, all rotaries.

By way of performance, model *K* was in its prime with the 130 hp *Clerget*, but since most examples of this type carried the 100 or 110 hp engines, performance characteristics quoted here will center on those examples.

At sea level, the *504K* knocked off a neat 95 mph, which was reduced to 87 mph at 8000 ft. and 85 mph at 10,000 ft. It climbed to 3500 ft. in 5 min.; 8000 in 10 min., and to 10,000 in 16 min., not bad for a trainer! To top off this performance, official records show the *504K* got to 20,000 ft. in 65 min.—its ceiling was still a little above that!

With full load the *504K* could maintain level flight at 40 mph near the ground, and stalled out at 35 mph. Its normal fuel capacity was good for 3 hours, or 225 miles at 10,000 ft. altitude, but by using only 3/4 full power it could stay up 4 hrs. 15 min. at 10,000 ft.

One of the *504K's* virtues as a trainer was perhaps the fact it was one of the easiest ships to fly ever constructed. It was exceptionally light on the controls, especially the rudder, which was balanced. It was sufficiently stable to fly hands off for extended periods of time. In its prime it was said of the *Avro* that "a pilot who can fly a *504K* perfectly is capable of taking up any machine from a *Handley Page* to a *Camel*." In addition, this little ship could be glided safely at very low speeds, and it did not stall or even lose flying speed without plenty of warning.

As far as acrobatics were concerned, the *Avro 504K* was capable of doing anything on the books, including the hammerhead stall. . . . Next month dimensional and structural details of this rugged little trainer will be found in these pages.

Championship Radio Control

(*Continued from page* 23)

speaker that a contestant is really interested in. Harry Geyer of Beacon Electronics will remember how we kidded the contest directors into shutting off the P.A. during an official flight, "because the emission might effect the contestant's receiver." Well, we had to think of something. Those loud speakers could get on a contestant's nerves in his weakened condition.

Now for the problem of controlling radio signals to prevent mutual interference between contestants. The system at the Nationals of a red flag to clear the air for a contestant's official flight, and a green flag to indicate "everybody's air," was a good try but not too satisfactory. Allow a suggestion on that. Two flight circles (or spot markers) could be located approximately as shown in Fig. 1. The simple rules would be as follows:

1. A contestant performing an official flight will move to *either* circle (marked 1 and 2) *with* his transmitter and have top air priority and 5 minutes in which to become airborne. A car is permitted at the circle if necessary.

2. The contestant next in line must occupy the alternate circle within the official flight time of the first contestant or forfeit his turn in line for his official flight. The contest director may extend the time to not more than 10 minutes beyond the official flight time of the first contestant, if circumstances so dictate.

3. After the first contestant lands or fails to fly, the second contestant is allotted 5 minutes to become airborne. The contest director may extend this time not more than 5 additional minutes if circumstances so dictate.

4. Contestants who wish exclusive use of the air for ground or flight test purposes must wait until either circle is not needed for the use of an official flight.

5. If neither circle is needed or occupied for an official flight or test, the air is free to all contestants.

6. It is the duty of the judges and contest directors to see that neither circle is occupied without the use or intended use of a transmitter.

The advantages of the two circle system should be obvious. It will keep the contest moving along since contestants can see by a glance at the circles just who is up, who is next and if necessary make ready. Air priority is determined automatically by viewing the circles and no flags or other signals are necessary. Spectators know where to stand to view the takeoffs and landings without milling all over the field. It is not necessary for a contestant to release his ship from within the circle but at least *he* should be there. Alternate circles or spots (marked "alt.") could be provided in case of an important wind shift. Judges would not have to run themselves ragged from one place to another depending on where so and so decides he would like to take off.

One more major problem remains. A drone circle D is needed downwind of the contest site, in which all ground testing of engines is to be done. With all contestants in space C, engine noise so close to HQ could soon spoil the whole plan.

So there it is in brief. Details can be filled in as needed. As radio control contests get bigger, some system such as this must be resorted to. No doubt the idea can be improved still further. Let's argue.

Now for a brief review of some of the contestants at the 48 Nats and their ships. Being a contestant myself—and for the first time—I was far from being as relaxed as one might be if he were merely reporting the event. Consequently some contestants and their ships and problems were not thoroughly met. Some 21 contestants signed up, 18 showed and 16 flew.

Top man of course was Jim Walker with a very realistic red job of about 8 ft. spread, and 8 lbs. The control, which he calls the *Pozzipo*, responds to a carrier wave of several selective time duration intervals. He can get right or left rudder and up or down elevator in movements of one-third, two-thirds or full. Two-speed motor and motor cutoff are also included. It is really a beautiful system and provides a high quality of controlled flight. Jim (among others) demonstrated that a radio controlled job can be built so that it is nearly indestructible. In one of his sloppier moments (which practically all of us had) his ship spiraled smack into the concrete runway. There must have been a lot of mixed feelings among contestants that the bigtime operator in radio control was out of the running but that it was regrettable any top contestant should get such a bad break. We all got fooled though. In a matter of hours the ship was repaired, dried and back in the contest. What workers Jim and his assistant Johnny are!

Second place was won by George Trammell with his selective pulse-length control. This control and its magnetic actuators were described in the June 1947 issue of this magazine. He had rudder and elevator control (two carrier waves) which responded to the difference in time a carrier wave was on the air, as compared to the time it was off the air, in a given short time interval. This control also gave a high degree of maneuverability. Consecutive loops were apparently an easy matter and Trammell was plenty sharp on his spot landings. His first official flight was one of the high spots of the R.C. event.

Third place went to E. R. Foxworthy with a standard Good Bros. escapement actuating twin rudders. This ship had a rather low degree of maneuverability but was the smoothest flying airplane in the event. He used fixed wing slots which may have had a lot to do with it. If you've ever seen a seagull just cruising, that's it. Almost no excess speed when recovering from a turn; made you want to just lie down in the grass and watch it fly. Foxworthy also made the closest spot landing of the meet.

In fourth place was L. V. Brown with a ship that flew much like Foxworthy's and had a Good Bros. escapement on a single rudder but with two speed engine control thrown in. A little hard luck (it's part of the contest) landed him in the only lake for miles around. A rowboat got him there just as she was "going down for the last time." After a good sunning the ship was back in the fight.

Fifth place went to Leon Schulman with an Aero-trol set and rudder escapement. Just the straight stuff. Schulman, you did all right—you have contest ability. We haven't—yet. I watched you sweat that ship out on the half mile! Leon had an interesting trick in that one wingtip of his yellow ship was painted bright red—a big help when the model was some distance away and he tried to figure whether she was "coming or going." As another point of interest, one of Leon's ground crew was detailed to rotate the transmitting antenna while the ship

(*Turn to page* 44)

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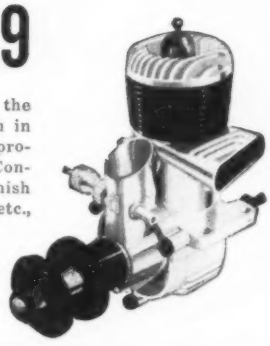

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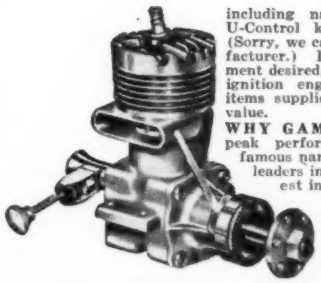

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circled the field, so that the plane would always get the maximum signal.

Now, in 6th place, guess who—us! We gave *Rudevator* its first fling at the Nationals. Not too much on results but some of the most point winning excuses at the meet—except that they didn't allow any. (The fellows from 7th place on down will please pardon me while I talk about our problems.) In the first place our ship was pretty green. It was our latest design and *supposed* to have everything. There wasn't much time to "wring it out" before the contest and the ship turned out to be somewhat difficult to handle. But then, maybe I'm the nervous type. I remember getting pretty badly lost on a distance try. My partner Dick Schumacher (who flies the big stuff for a living) took over much to my embarrassment; he got it back on the beam—but not without difficulty.

The ship was small and short coupled for reasons that were thought to be good at the time. Here is an interesting and sort of confessional observation about *Rudevator* or any other single step control, as compared to a control like Walker's or Trammell's. A single step control must be fitted more closely to the model's flying characteristics than a "true" proportional control. In the latter case the amount of control used for any maneuver can be applied in accordance with the model's requirements for that maneuver. A single step applies all the control at once so the amount of this control must be set on the ground to best fit the model's requirements, and thus produce the desired results. Although Walker's and Trammell's are not true proportional controls they closely approach it. Trammell's approaches proportionality very closely, and Walker's is a triple step affair rather than a single step control, as are the escapements.

The only catch is (and this is what seems hard for the radio control dreamers to understand) that you never get something for nothing. In Walker's case a brain box is needed on the ground to measure out each signal length. In Trammell's, one carrier is needed for each control. All control systems are a compromise; even *Rudevator* presents a pill to be swallowed by the user who wants the three basic controls for the least effort. That pill is the rather unconventional rotary control surface on the tail. Of course for those of us who are *Rudevator* boosters, that is an easy pill to swallow, in exchange for simply turning on and off one carrier to get three controls.

Well, to get on with our problems at the meet—which someone may profit from in the future—we soon found that the positive engine cutoff on *Rudevator* (as described in July '48 M.A.N.) was just N.G. for Nationals contest work. Engine failure at the Nats can mean a lost flight and you only have five officials. So we shunted out the engine cutoff. Next we found we couldn't keep the gas tank feeding in violent maneuvers and our ship was one of the most violent at the contest. Jim Walker helped us out with his balloon tank idea which is the best we have found yet for the problem.

By this time we had lost plenty of points. We had the smallest ship at the meet. On trying for the half mile cross country event we found we couldn't even see the thing well enough at that distance to keep it straight. So small ships are no longer to our liking. Six feet of span seems about right, but no smaller. Last but not least, the high winds aloft caused trouble. We couldn't plow into them

enough to keep the ship within a reasonable distance of the field while we concentrated on maneuvers. In other words we lost too much of our allotted flight time fighting up wind. To dodge the winds we tried to fly too late in the evening. The judges warned us. (We lost the ship in the dark and the field mice took over). Found it again the next day with the help of a real airplane. That put us out of the running. But the ship seems to fly a little better since the field mice removed some of the trailing edges.

Since the wind was not our private trouble but bothered others as well, allow one more suggestion. Wind velocities can be high at any Nationals. Two methods are available to combat it. High speed ships—or more time in the air. Let's not force entrants to build high speed ships so they can best high winds at such contests. Fast ships can't be flown in close to a crowd like present ships, without the possibility of hurting somebody. So let's evolve a simple formula whereby the allotted flight time per official flight is 10 minutes plus say one minute for every three miles of wind velocity at 1000 ft. altitude as determined by the latest report from the nearest weather station. In this way a contestant need only provide enough gas aboard, and slow or fast his ship will have a more equal chance as long as the winds aloft are within reason. Thus a 15 mile wind aloft (which is plenty) will give him 5 extra minutes of flying time to battle it. Another suggestion has been made which may be even better. Allow five flights and/or a total flight time (of say one hour) whichever occurs first.

A final word about *Rudevator*. There was nothing wrong with it at the contest; it just sat there dumb and happy waiting to get on a good ship. Imagine an airplane that wouldn't even loop without rolling out at the top of it! Nuts!! We fixed the engine cutoff problem upon returning home by adding a thermal delay ignition circuit breaker so that the control could go through the cutoff position without affecting the engine, unless given time enough to cut ignition. This idea originated with the Good Bros. Our thermal delay stays open and saves the ignition batteries on the way down. The final *Rudevator* design is shown in Fig. 2 along with the thermal delay unit. A push-button resets the latter. Another advantage of the delay is that the advance ignition circuit no longer has to run back to the tail for cutoff. This means shorter ignition wires and better engine operation in the advance position. The retard ignition circuit still goes back to the tail for two speed switching, but the extra resistance here is less critical at the lower engine speed. As was said, the balloon tank is our best solution to the gas feed problem in violent maneuvers until Walker or someone shows us something better. Now all we have to do is tame that ship down or build a new one with less smarty pants design in it!

•

Scrap Box

(*Continued from page* 1)

without a motor cut-off that can be operated from the transmitter. Of course, if the receiver is out you can't shut the motor off either, but the point is that many a heart-breaking crash can be averted, and a lost flight may be stopped before the ship gets out of range, again provided that the receiver is on the job. On one of our flights, the ship crossed into the next town and scared the wits out of a backwoodsman out with his dogs. Just as the ship came over, the motor cut and the rudded put the job into a tight spiral. Dogs took off in every direction. The hunter's neighbor afterwards told us that they thought the "Germans were bombing us." By the next morning there was talk of "flying saucers." At any rate our first attempt at radio was a howling success, despite the fact that battery life is only about a tenth of what they claim—and does that get you into mischief! P.S. If you have trouble, check the batteries. We do so after every long flight. Between flying sessions we always change all the flashlight-type batteries.

As usual, we get to worrying at this point about squeezing in news from the dozens of correspondents from many countries who write in each month. How about a whirlwind Cook's tour? Got your hat? Here goes.

Ernest Jones, who lives in one of those four-line-address places in England, packages miscellaneous dope, pictures and stories. One of Jones' neatly built ships is a 12 inch S.E. 5, powered by a Mills Diesel. Flew 25 mph on 30 ft. lines and will loop on 20 ft. lines. When a friend of his lost an out-of-sight model he received this card (which we have before us, so 'tis true!): "A model aircraft with your name and address was picked up on this farm on Easter Monday morning. It has a broken wing, but there are no casualties. Aircraft safely in hangar until you call. Pilot interned." Must be the air age!

Frank Greene wrote to say that the *Lakeland Model Club*, Californy, held the first of a projected series of *Infant* contests. This one was free flight, held in a parking area, the goal an average of 1½ minutes for three flights. Who won? Don Newberger. And that isn't a tall story. The rub in this small engine business is the glow plug. Manufacturers with limited finances can't compete unless they find someone to make the special glow plugs required. Somebody we know paid a whale of an amount of coin of the realm to somebody else we know for such a machine, and now the second somebody gets their plugs from the first somebody. By gosh, these engine makers deserve credit for the way they try to please! Making engines is a costly business that separates the men from the boys, as they used to say about the B-26.

Bill Dean, England, kicks in with more dope on the Wakefield. Their elimination trials will be held July 2 at Fairlop Aerodrome, 45 minutes by "underground" from center of London. Finals will be held July 31. Hear rumors that our own Nationals will coincide with this date. Isn't that just like us, to foul up the world's greatest contest. *Scrap Box* is wondering how it can win the Wakefield and be National champ on the same day—harump! Men like Copeland and Warring, among the world's best, have blood in their eyes. Warring is building a half dozen machines.

Everett MacKeen (44 School St., Concord, N.H.) offers to help R. David Matthews with a clamp-on exhaust for the latter's 11-year old *Brown* that has been cooking with glow. Seems Matthews is grounded. Can't keep up with the mail as is, David, so write MacKeen direct. Not to start a Swap column, but do any other guys need something?

Another scrap will start with this dope from Bob Breer, Mitchell, S.D. "We disagree with the necessity of a 'bat' or flying wing for a stunt ship," the man sez. "The only argument against stunters is that they don't look like a real plane, but when modelers become more experienced these flying sticks won't be around. Why can't

full stunt look realistic?

Bob also notes: "Glow has been a break for beginners, but we use ignition on our *Orwicks*. After a long process of learning stunts with crutches we have turned to realism, building *Orwick* scale jobs for a little fun in stunt, and perhaps a prize in flying scale. For strict aerobatics we use semi-scale ships. My opinion on free flight: require r.o.g., increase power loading, eliminate Class D. But just give me an *Orwick* and a *Go-Devil*."

Boyd Feldstad, South Australia, sends news of the Australian Nationals held at Bankstown Aerodrome, New South Wales, on November 20 and 21. Some of the times are interesting: N. Bell, towline, 10:32; A. L. Joon, Wakefield, 6:00; W. Evans, free flight, 7:20. Many events, but only in speed do the boys from "Down Under" seem far behind us. Class D speed was 110.9, won by L. Stevens.

Jack Joseph (Please put full addresses on letters, men) wants to know about the possibility of inverted flight with an N2S trainer, also type air foil to use. Symmetrical sections mess up scale models. Inasmuch as J. C. Yates stunted Bob Palmer's beautiful *Stearman* all over the sky at the last Nationals, Jack, we sugggest you try writing him in care of: Burbank Manufacturing Co., 120 E. Santa Anita, Burbank, Calif.

Last but by no means least is the tall but true story department. If all the stories received this month were laid end to end they would reach to next year's Nationals. One that is tall, but not too tall, arrives from Kalamazoo:

"After completing a revamped *Fireball*," tells Bill Van Tilburg, "the plane was disassembled and hot fuel proofed. After the plane had dried two days, a friend came over to see how the much publicized glow plug affected my motor and plane. The motor was quickly installed and the plane reassembled. On takeoff the motor seemed to run faster than usual, but the ship was slow to leave the ground. Being the first time the plane or motor was run on a glow plug, the ship was held level about 15 feet off the ground. After eight or nine laps the motor cut and the model made a perfect landing and rolled to a stop.

"Upon refueling, it was discovered that I had neglected to connect the push rod to the bellcrank and all during the flight the plane had flown itself!"

One year's free sub to MODEL AIRPLANE NEWS for the man from Kalamazoo for that tall but true yarn. And we are sorry we can't squeeze in more news. See you next month.

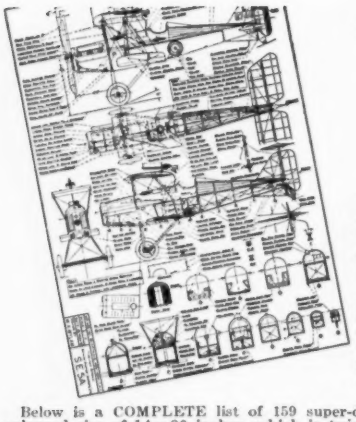
Star Flight

(*Continued from page 21*)

uneven fields. In addition, this amount of maximum power permits throttling the engines down to very low fuel consumption range for cruising.

Next problem was range: how much? All agreed that the busy executive would have little use for a "puddle jumper" with its necessity for a fueling stop every few hundred miles. Another consideration was the problem of changing flight plans enroute due to thunderstorms, turbulence, etc. Many lightplanes have been lost due to "weather," but the Monsted-Vincent group reasoned that most of these were due to the fact that the pilot tried to go around the storm, got trapped and ran out of fuel, resulting in a fatal forced landing. To *really* go around the biggest of the storms, the group came to the conclusion that eight hours of endurance would be required, and this figure decided the plane's range requirement. (This also presented another important problem that was solved by the installation of a compact lavatory aboard the craft!)

These design considerations are normal and conventional, but it was the next three steps that separated the *Star Flight*



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from the run-of-mill airplane and evolved an unconventional layout. The wing location was studied and when it was found that propeller clearance would require at least four feet, it appeared obvious that a low wing design would require a stepladder for entrance and exit and the high wing location was selected. This placed the bottom of the fuselage just a convenient step from the ground.

Then came the major decision: tractor or pusher? With a tractor installation, the executives would be located directly under the wing with the propellers spinning right alongside their windows, while the pilot rode up forward in quiet and comfort—certainly a case of the cart before the horse. Study of a pusher layout showed that the fuselage could be extended forward with all the passengers ahead of the wing, excellent from the point of noise-reduction, view and comfort.

One more knotty problem remained to be solved: where to stow the tricycle landing gear, which was a "must" from the beginning. There was more space in the wing than in the fuselage, but the engineers knew that the stiffening and "beefing" of large wheel wells, long struts and complex mechanism would add excessive weight. Instead, short units were designed to rotate directly into the fuselage in a manner reminiscent of the Douglas XB-42 *Mixmaster* bomber.

With the airplane layout thus determined the problem of detail design began, but not without further though less complex problems. For example, as the design proceeded and weight estimates began to take shape it became apparent that mounting of the engines in the wing trailing edge would require an extremely long nose to compensate. Therefore the engines were moved forward to the main spar and short extension shafts specified to the propellers mounted at the trailing edge.

Location of the props in the rear presented an engine ground cooling problem since the slipstream from the props could not be directed into the engine cowl as on tractor installations. To provide this ground cooling, each engine extension shaft mounts a cooling fan to draw the air past the engine. Once in flight the incoming air from the scoops beneath the wing removes the drag on the fans and little or no power is taken from the engines for cooling.

To give eight hours endurance to a four engined airplane requires a substantial quantity of fuel (43 gals. for each engine, 172 gals in all). The 1032 lb. weight of this fuel is no small item (nearly 1/4 the airplane's gross weight!), and its location in the fuselage would have required both space and additional weight in the form of wing strength. The group therefore located the fuel in the *outboard* wing, where its weight is supported by the air and not by the wing spar fittings!

All-metal construction was a "must" from the beginning and after final design detail drawings had been okayed by all concerned, plans were made for construction. Space was secured in the wartime Higgins Industries hangar on Michoud Airport near New Orleans, and construction got under way in October 1946. Two years later the prototype was completed and test pilots (you guessed it!) Vincent and Monsted donned parachutes and took the *Star Flight* aloft on its first and successful flight. The group wasted no time on the ground with their creation in flying condition, and since that first

flight the slim silvery ship has been aloft on every possible opportunity.

Like most prototypes, the *Star Flight* indicated some desirable changes. The fixed-pitch Sensenich propellers didn't give the desired performance under both takeoff and altitude conditions so these have been changed to controllable pitch designs giving a wider range of effective thrust. And like all designers and test pilots, Vincent and Monsted decided more power was needed and they are installing Continental 90 hp engines.

Serious about early marketing of their executive airliner, Vincent and Monsted are already nearing completion on the No. 2 airplane to be used for static test data for CAA Type Certification tests. The Prototype is being used for the CAA flight test portion of the certification.

The Monsted-Vincent *Star Flight* has an empty weight of 3200 lbs. but they expect this can be cut to only 3050 lbs. with a little more care in production. With its load of 172 gals. of gasoline and five people aboard, it has a gross weight of 4800 lbs., certainly no "light" plane by any stretch of the scales. But its wingspan of 48 ft. and length of 34 ft. proves it is not even in the lightplane category.

Early flight tests indicate the *Star Flight* can cruise at 145 mph which, while not the fastest speed available in the private plane class will, when continued for 8 hours produce a range of 1160 miles, twice as far as other four place designs now flying.

The Monsted-Vincent group has spared no pains in giving their little airliner all the big airliner reliability. For example, fuel injection is used on all four engines, to eliminate the carburetor and its icing danger. This feature also eliminates mixture controls and carburetor heat controls, eight other knobs the pilot would have had to worry about. Complete heating and ventilating equipment is carried for passenger comfort in all types of weather. The spacious high fin of the big airliner is also incorporated together with the now orthodox dorsal fin projecting forward along the fuselage for improved directional stability in the event of single engine failure. Flap panels, interlaced in between the propeller shafts, extend from aileron to aileron to provide slow landings. And a tiny device "stolen" from the latest swept-wing jet fighters is the use of shallow strips chordwise along the wing just inboard of the ailerons. These tiny air dams prevent any drift of the boundary layer and thereby preserve adequate aileron control near stalling speed.

It is impossible at this time for Monsted-Vincent to estimate even a rough sales price of the new airplane. But they are frank to admit it will cost considerably more than any single engine airplane now on the market (about $10,000 for the Ryan *Navion*, slightly more for the Beech *Bonanza*). But of interest to the potential industry purchaser is their equal frankness in stating their new *Star Flight* will sell for less than any twin engine airplane now on the market!

As oldtime aircraft manufacturers and ambitious GI's began to think of the postwar aircraft sales picture, most prepared to do business on the same old competitive principles: build an airplane to sell for less than the other fellow's comparable airplane. But Monsted-Vincent have taken an entirely new approach to the problem: offer an airplane that nobody else has; build one that is literally in a class by itself. In the new *Star Flight* its designers have accomplished just that and have given the busy executive the solution to his air travel needs.

Air Ways

(*Continued from page* 31)

unclimbable tree. As nightfall approached, the owner was frantically trying to enlist the services of a telephone lineman or a tree doctor. To top it off, that night a heavy snowstorm came up!

Now let's just list what we did wrong, in the hope that other eager beavers will read carefully and perhaps be dissuaded from making the same mistakes.

1. The motor was brand new and probably stiff—it couldn't be slowed down.

2. There was no ignition cutout timer—engine run had to be limited by the very inaccurate method of filling the tank only part full. (We guessed wrong—it ran for about 25 sec.!)

3. The ship had been glided a bit but was entirely untried with power. It stalled quite a bit under power so we could not see whether the radio took effect or not. The glide was flat, however—we thought it was *too darn* flat as we saw the plane coasting away downwind.

4. A cardinal sin—the owner's name, address and phone number had not been put on the ship; there were no identification marks whatsoever.

5. No tests had been made with motor running to ascertain the effect of vibration on sensitive relay, escapement, etc.

6. Having been finished in a hurry, the model had no color on it but was just the natural paper white—very tough to follow in the air and to spot in a tree or on snow-covered ground.

7. No real check was made of wind direction, with the idea of getting as far upwind as our flying field would allow.

Quite a list of sins, to be sure. Of course, if all the breaks had been with us the model wouldn't have been left in the top of a huge tree in a heavy snowstorm—but they weren't, and the model was. The moral is very simple: don't launch your ship with R. C. until you know the ship and motor thoroughly. Watch the wind direction. And as for the radio equipment—check, check, check. Finally, if any single element is not just right, *pack up and go home*. Wish we had!

* *

This month we launch out with an unusual flyingboat design sent in by H. Watkins (6 Waungron Rd., Llandoff, Cardiff, Wales). It was inspired by the plans of *Tadpole* in our Nov. '48 issue. Mr. Watkins made a few alterations; the main one was the installation of a *Jetex* solid fuel motor. The *Aquabug*, as he calls it, has a span of 21" and total weight of 2-3/4 oz. Mr. Watkins states that a whole crop of these *Jetex* flyingboats were seen in his locality shortly after the November issue of M.A.N. reached there. He wishes to give credit to Mr. Luxton of Cardiff for this photograph.

No. 2 shows Denton Birch (Box 307, Rigby, Idaho) holding his ill-fated stunt plane. This ship proved rather sensitive to fly and was demolished on its sixth flight when he attempted an outside loop. The plane was powered by an *Atwood Glo-Devil* 60, which he states is the finest engine he ever owned.

The widely popular *Skipper* (M.A.N., April '48) appears again in No. 3, sent by Paul Etchebarne (1030 Doran St., South Pasadena, Calif.) This ship was just completed and had never been flown under power when the picture was taken, although the glide seems very good. The plane is finished with a skyblue wing boom and rudder, while stabilizer and fuselage are yellow.

The neat white ship in No. 4 is a scale model of the Japanese *Betty*, painted as was the original plane that carried the Jap peace envoys to meet Gen. MacArthur. The 13-1/2" span model is all white with green crosses. Robert Mikesh (306 Oakwood Ave., Ottumwa, Iowa) carved windows and blisters for this model from laminated plexiglass taken from the original plane before it was destroyed after the Armistice was signed.

The Burnelli-type model shown in No. 5, sent in by Alen Chadwick (440 Ellis St., Syracuse 10, N.Y.) was not quite completed when the snapshot was taken. The empty spaces at the wingtips are now filled by fixed ailerons. This model has a 48" wingspan and 580 sq. in. area; it's powered by a *Viking* 65 twin engine buried in the wing. Although the control surface appears to be very small, it was found sufficient for positive and quick maneuvering. The ship was considered to be quite a successful flier.

Another model made from M.A.N. plans is seen in No. 6. This is Frank Le Donne's *Wanderer* (614 State St., Fairmont, W. Va.) and his first rubber job since the war. It has proven to be an excellent flier and placed first in a rubber event at a local contest with exceptionally good flights. This pleased Mr. Le Donne since he is mainly a gas model enthusiast and the first place win brought him an *Arden .099* to add to his collection.

Charles F. Warren (5035 Walnut St., Philadelphia, Pa.) built the dummy *Hornet* radial engine No. 7, to be installed in his latest scale model. He found that the cylinders could be made up very realistically by constructing them of thin aluminum washers fitted over a balsa dowel, evenly spaced, and glued in place. This fine picture was taken by a friend, Stanley Bean of Amesbury, Mass.

An unusual jet powered model appears in No. 8, submitted by Capt. F. G. Smith (Sqdn. A, Box 125, Muroc AFB, Muroc, Calif.) The first flight of this ship, powered by a *Red Head Dyna-Jet*, was unofficially clocked at 120 mph. The ship has 40" span, 30° sweepback, and the airfoil is NACA 2A12.

A ship that started out to be just an accurate scale model, but which turned out to be a good stunt job as well, is shown in No. 9. When Frank Beatty (2115 N. 19 St., East St. Louis, Ill.) first saw Bill Wylam's scale plans of the *Pfalz D 12*, he immediately set to work to make an accurate U-control copy. The ship travels at a snappy 70 mph under the urge of an Atwood *Champion* and has a 44" wingspread. The fuselage is fully planked and the wings are covered with Silkspan. Flying on 70' lines, the model has done 5 consecutive loops. This fine ship weighs 3 lbs. 1 oz.

Another successful model built from M. A. N. plans is the *Valhalla Visitor* by Jack Hegley (3104 Willett Ave., Pittsburgh 27, Pa.), illustrated in No. 10. He tells us nothing of the performance but notes that when the photo was taken the plane was already a veteran flier.

Up-to-date modelers who look at No. 11 will wonder if we are going backwards in our designs. It happens that this is just the case, for this ship was described in a 1939 issue of M. A. N. by Chet Lanzo. Mr. V. M. Tyrrell (82 Sackville St., Kew E. 4, Victoria, Canada) was looking for a good stable airplane for some R. C. experiments and settled on this ship, which has proven to be a fine choice. When the picture was taken, the model was being flown by a *Foster 99*, but it has also been powered by an *Ohlsson 60* and a *Super*

Cyclone. Mr. Tyrrell says that when the radio equipment is installed, the ship will be flown with a Hearn *Tempest* engine, an Australian design similar to our *McCoy 60.*

A tiny free flighter, powered by an English *Kalper* diesel, is depicted in No. 12, our last photo. The ship was designed by Austin Hofmeister (10 E. Overlea Ave., Baltimore 6, Md.) who tells us that the model has a 22" span and flies under the power of its own 1 oz. engine. Wingspan and fuselage is covered with sheet balsa. The engine, which is of the variable compression type, turns up over 8000 rpm with the 6" dia., 5" pitch prop. Consistent flights of over 4 minutes with a full tank of gas are obtained in calm air.

NEWS OF MODELERS

PEN-PAL SEEKERS: T. Taylor, 165 Idris Rd., Papanui, Christchurch, N.W. 2, New Zealand . . . Floyd Carter, 9632 San Vincente Ave., South Gate, Calif. . . . Tom C. Warren, 13 Hindley St., Ashton-under-Lyne, England . . . M. Franklin, and his brother G. Franklin, 98 Grasmere St., Leicester, England.

EXCHANGE MOTORS: J. A. Field, 43 Abbey Road, Waltham Cross, Hertfordshire, England . . . F. N. Potter, Peveril House, 82 Beeston Road, Nottingham, England . . . N. Keary, 2 Broad Road, Swanscombe, Greenhithe, Kent, England.

EXCHANGE MAGAZINES, PLANS, ETC.: J. F. Wilson Smith, 10 Courtenay Place, Teignmouth, Devon, England, Hon. Sec. of *Model Craftsmen's Club,* would like to correspond and exchange merchandise with an American club . . . Max Dinkel, 10 Melbourn St., Royston, Herts, England . . . Peter B. Ward, 28 Earlsburg Gardens, Handsworth, Birmingham 20, England.

SPECIAL REQUESTS: R. F. Metcalf, 214 Morley Rd., Barking, Essex, England (28) is a photographer by trade and would like to correspond with anyone interested in model aircraft and photography . . . Munro Kreinik, 42 E. Hudson St., Long Beach, N.Y., has an *Arden .199* and an *Atom* to trade for two *Kent .012* C. I. E.'s . . . Jack Schuster, 875 Lansdowne Ave., Toronto, Ont., Canada, secretary of *West-End Strato-cats,* would like to correspond with clubs or/and model enthusiasts . . . Vincent P. Yates, 34 Woodclose Ave., Coventry, England, wishes to obtain a good class A or B glow-plug engine. He of course would send a brand new English engine in exchange . . . Lyn Sanford, 73 Cumb Ave., Portland, Me. would like to borrow a complete set of 1:72 scale plans of the Defense Recognition series for tracing . . . Neil K. Southwold, "Sea-Mist", Berry Head Rd., Brixhum, S. Devon, England, is eager to exchange some new British motors, Dunlop Aero Strip, quality 6010 (the rubber that won the Wakefield '48), and plans for some American engines and/or accessories.

CLUB NEWS

California

Another new club has been started on the West Coast, this time at Montebello Sr. High School. With a new school gymnasium, Tom Rose, head of the aviation department, has scheduled an Indoor Precision Rubber Power contest for May 12. Classes A, B, C, D, and H-L and Cabin. This contest will be run on a total time basis nearest to a set time, plus a handicap system for model pilots not in the "champion" class. Invitations are extended to all model fans and clubs interested, to set aside May 12 for something new in Indoor Rubber Power contests. Address questions and inquiries to Tom Rose, Head of Aviation Dept., Montebello Sr. High School, Montebello.

The *Los Angeles Aero Modelers'* election of officers were held and Lew Mahieu and Russ Barrera were elected President and Vice President, respectively. Meetings are held the 2nd and 4th Monday of each month at the Parkview Recreation Center, 412 S. Parkview. All outfits in the Southern California area are invited to affiliate if they desire to support an organized program of model flying. Secy. Andrew Petersen sent in this data.

We copied the following information from the minutes of the *California Association of Model Clubs* latest regular meeting held in December. Contest Dates cleared through Contest Commissioner Ocie Randall, 716 Waterman Ave., Fresno 1, Calif. *Free Flight Gas:* April 10—Bakersfield, Annual; May 29—Fresno, Annual; June 5—Sacramento, Annual; October 2—*E. B. A. A.,* Annual; October 16—Gilroy, Annual; October 30—Fresno, Semi-Annual. *Controline:* May 8—*Salinas Star Dusters,* Speed and Precision; June 5—*Mustangs,* S. F., Speed and Precision; June 26—Hayward, Precision *only;* August 21—Palo Alto, Speed and Precision; September 18—Antioch, Speed and Precision.

Indiana

The *Indiana Association of Model Airplane Clubs* has begun its second year

with a membership drive. All charter club members are being urged to contact as many organizations as they can in their area to encourage participation in the next meeting at Fort Wayne. Chief objective for the formation of an association of clubs such as this is to pool ideas and materials for the common welfare and general interest. Here are the recently received results of the *IMAC* 1949 officers who were elected at the club rooms of the *Elwood Prop Busters:* President—Bob Johnson of *Anderson Johnnies;* Vice President—William Marietta of *Clinton Model Airplane Club;* Secretary—Mrs. Glenna Williamson also of *Anderson Johnnies;* Treasurer—Homer Brown of *Hoosier Capitoliners;* Contest Director—Frank Nekimken of *American Legion.* The *IMAC* is a nonprofit association, formed for the purpose of promoting and contributing toward the advancement of model aeronautical activity in the State. Organization membership is open to any model airplane club in Indiana, and membership dues are $5 for each calendar year; these dues incidentally are nonreturnable. For further information concerning admittance, write to Secretary Mrs. Williamson, 2637 Meridian St., Anderson.

Kansas

Provided local model airplane enthusiasts will pitch in and do their own work, they were offered the privilege of using a portion of the new Bourbon County Fairgrounds for a model plane field. And pitch in they did. Previously only local playing fields or a few open spaces were at the disposal of the eager model fliers. Workers included schoolboys, laborers, as well as several of the City's most prominent professional men!

Just a reminder! The 1949 Nationals will be held at the Naval Air Station, Olathe, running from July 26-31 inclusive. Start making your plans to attend now. If you are in doubt as to whether it will be a good meet—ask anyone who was there in '48! Full information available from Jess Hall, Contest Director, Olathe, Kansas.

Kentucky

Newly elected officers of the *Louisville A. B. C. Model Club* began their duties at the first meeting held in January. A beautiful plaque was presented to retiring President Bob McKee in appreciation of his services as co-founder and leader of the club during its first three years.

They want suggestions from other clubs on increasing attendance at meetings. Everything from lectures by the "Experts" on tricks of the trade, movies of past activities, to just plain bull sessions, as well as a hired magician, have been tried to increase the turnouts. (Still averaging about 30.) Norman F. Robinson, club correspondent, recently wrote that the membership was 65, and now informs us that he was quickly and properly chastised by the secretary because there are over 100 dues paying members!

Michigan

Arthur C. Bassett, Secy. of the *Adrian Aero Club* proudly writes that the struggle to organize and create interest in model building in his locality since February 1947 has ceased and a steadily progressive club is now on its way with 30 active model builders.

Missouri

At their recent meeting, the *Mid-States MAA* set aside the following days for meets. Since these dates do not conflict with any others, AMA sanction is expected. June 12—sponsored by the Omaha Plymouth Dealers; June 25-26—sponsored by the American Legion and Plymouth Dealers; July 3-4-5—sponsored by the Tulsa "Y" Modelers; August 21—sponsored by the local club and others. "June" Pierce, Midwest Co-ordinator, sent in the above data.

New Jersey

The *Linden Model Aircraft Club,* sponsored by the Linden Recreation Commission, takes pride in announcing their 2nd Annual U-control "Flying Jamboree" to be held May 8 from 9 a.m. to 5 p.m. The site will be the Eighth Ward Athletic Field, Park Ave., Linden, which is 3 blocks south of U. S. Highway No. 1. Events will be: Beauty, Classes A, B, C and D speed and stunt combined. Entry fee is 25 cents per event. Two divisions are scheduled: Jr.—up to and including 17 years of age; Sr. and Open—18 years and over. AMA sanction pending. Ample parking facilities available at a huge parking lot 200' from contest area. Prizes will consist of merchandise and trophies ($500). Martin J. R. Mariog, contest and publicity director, *Linden M. A. C.,* Old City Hall, Wood Ave., Linden, will gladly give you further details.

The *Ridgewood Sky Hawks* held the 2nd Annual Beauty contest on Jan. 22. An Open event, many outstanding planes were entered, and the judges had a tough time picking the winners. The contest consisted of 4 divisions, flying and solid models, in Jr. and Sr. (including Open) classes. A special effort was made to see that every Jr. entrant received an award. Prizes were presented by two recently elected officers, Pres. H. Davis and Vice Pres. H. Sheffield, to the following winners: *Jr. Solid*—W. Gleger; *Jr. Flying*—P. Moncourtois; *Sr. Solid*—R. Waltke; *Sr. Flying*—F. Ehling.

New York

The Annual *Model Mirror Flying Fair* will be held this year at the same spot: Grumman Aircraft Field at Bethpage, L.I. The date is June 5; rain date June 12. Several new innovations are being introduced this year; one of these is that all speed events, in addition to having the usual stop watch timers, will be timed electrically to insure absolute accuracy.

In recognition of the growing interest in tiny motors of all sorts, a new class to be identified as "Class ½A," will be introduced at the Meet. Displacement of engines in this category will be from 0.0 to 0.08 cu. in. and this new class will be included in both free flight and controline events.

A change will be made in the Beauty Event this year in that all entrants must be ships which are also entered and actually flown in the controline or free flight events. In other words, any ship to be considered for a beauty prize must prove actual performance.

The radio control event will be included as it has been in the past, and undoubtedly this year, radio control activity will be greater than ever before.

In an effort to give the model builders every possible break, official model flying will be run continuously from 6 a.m. to 3:30 p.m., after which time model flying will be suspended and the usual show of big planes will take over until 5 p.m. During the later period, times will be checked so that as soon as the big plane show is finished, prizes can be awarded without holding the winners any longer on the field than necessary.

Ohio

The 2nd Annual National Model Plane Exhibit Contest will be held at Cleveland on March 12. Entrants in the 1949 event will be classified in groups of school grades and not according to the conventional age group classification of the entrants. Any model builder may compete, but each contestant is limited to one model in each event. Rules and regulations state that the entire model must be built and assembled by the contestant, but the model design may be obtained from any source. Kit designs are acceptable. Headquarters are at Room 310, 1001 Huron Rd., Cleveland 15. Dr. E. Ray Sharp, managing director of the National Advisory Committee for Aeronautics, who is general chairman, emphasizes that there is no entry or admittance fee.

Oregon

The *Medford Prop Nuts* held their U-Control contest December 5. The weather was good, but for several days before it had been terrible and scared most of the out-of-towners away. Following are the results: *Class A Speed*—Fred Young 83; *Class B Speed*—Dale Newton 101; *Class C Speed*—Albert Allen 63; *Class D Speed*—Ray Edwards 126; *Stunt*—Maury Morton. Thanks to "West Coast Model News" for this data.

Pennsylvania

That energetic group, the *Bristol Aeromodeleers*, have now neared the 60 membership mark. Secy. C. Wells says these are not just "names," but attendance at *weekly* (not monthly!) meetings is from 30 to 40 members! Their local field has been so crowded with model fliers that it has necessitated a compulsory 5 minute starting limit so as to give each person a chance to fly. A great many movies are borrowed from the Film Library, U. S. Naval Yard, Building 4, Philadelphia. Mr. Wells thought other clubs would be interested, and he comments that there are fine aviation movies available as well. Perhaps you'd like to know more about their secrets for successful meetings; if so, write the secretary—P. O. Box 5, Bristol, Pa.

Texas

President Tom R. Poole Jr. of the newly-formed organization, *Greenville Model Club*, writes us that a local sporting goods dealer, Jack Bye, was only lately convinced that he should carry a model line. Although the club has held two meetings since December 6, interest is good and membership is now 17. Disagreeable weather has kept flying at a minimum but preparations are being made for the coming season. A novel idea: every member brings a plane to the meeting; each plane is examined and the builder receives a number of suggestions from other members who see something that may cause trouble. They believe this is an excellent idea since it gives the modeler experience at the expense of someone else, and when he sends his plane off for the first time he can be reasonably assured that it will not fail him. Several members have free flight ships; however, U-control craft are owned by every member and that is their chief concentration. Club meetings, incidentally, are held the 1st and 3rd Mondays of every month. If interested, write Secretary James G. Bryson, *Greenville Model Club*, Box 1038, Greenville.

New Zealand

Here is a report of the first Nationals ever held in New Zealand. Originally scheduled for 1947-48, they were postponed and eventually cancelled owing to the poliomyelitis epidemic. However, on December 30, 1948 contestants from all N. Z. gathered at Wanganui for the big event. Among those competing were Brian Marsh who topped New Zealand's entrants in the Wakefields last year, and also Vern Gray, winner of the Moffett Trophy in 1937. Thirteen events were scheduled. On Jan. 1, when the controline events were to be held, a high wind kept many models on the ground. However, R. Olliver of Tauranga held the spectators' interest all day with his perfect demonstration of control. Under his able guidance the model did everything, and even when he slipped and fell he still managed to keep his model flying.
Results: *Fuselage ROG*—N. Hewitson 7:1; *Glider H. L.*—J. Woodley 4:39.8; *Spar H. L.*—A. Macdonald 13:35; *Indoor Round-the-Pole*—A. Macdonald 3:40; *Indoor Free Flight*—G. Perkins 6:54. The prize-giving ceremony was held in the Savage Club Hall on Jan. 3rd, when Overall Awards were given to the following: *Champion of Champions:* A. Macdonald 138 points; *Jr. Championship:* J. Woodley 44 pts.; *Champion Rubber and Glider:* J. Woodley; *Champion Free Flight Gas:* N. Hewitson; *Wakefield Champion:* H. Bissenden; *Control Speed Champion:* M. McCrorie; Control *Aerobatic Champion:* Pryor & Olliver 930 pts. Thanks to Gordon S. Smith, managing director of the "Betta" Model Aeroplane Supply Co., New Plymouth, for sending the above info to us.

Class D Rubber Cabin Model

Of interest to beginner and expert alike, the Deb is a very attractive rubber job, which has proven itself in contest flying. Folding tree wheeler prop, folding landing gear, and anhedral stabilizer are just a few of its features. Build it from plans in May *Model Airplane News*.

Eight Ball

(Continued from page 17)

ment. Wing and stabilizer hooks are now fixed in place. The other half of the pylon leading edge is then glued on the pylon.

Wing and stabilizer mounts are of hard 3/32" sheet balsa. Glue wing and stabilizer mounts securely on fuselage frame. Place two pen cells in battery box space as shown on plan and plank around them with 1/16" sheet balsa between formers A, B and C.

Use former A as a pattern for the firewall which is cut from 1/8" plywood. Following the dimensions on plan, form a landing gear from 3/32" diam. wire and bolt securely to the firewall with metal brackets. Now the firewall may be firmly glued against former A.

The fuselage is completely planked with 3/32" x 1/4" strips. Shape engine cowling from a 2" x 2" x 3" balsa block and, after mounting the engine, glue the cowling into place for sanding. The top half of the cowling was made removable in case it is necessary to make future thrust line adjustments. The fuselage is then sanded smooth. Two coats of wood filler (talcum powder and dope mixture) is then applied and sanded between coats. Next, cover the fuselage with model airplane tissue. Now apply two more coats of the talcum powder and dope mixture and sand smooth. This method not only gives a plastic like finish but also is more oil resistant and durable. The original model had two coats of black dope sprayed over this finish.

The stabilizer is of very strong construction. The leading edge is of 3/16" x 1/4" medium strip balsa. Pin firmly to plan, taking care to assure an even elliptical curve. Cut out trailing edge parts from 3/16" medium balsa sheet, and trim down before gluing together and pinning on plan. The tips are cut from 3/16" sheet balsa, and glued into place. Ribs are cut from 1/16" sheet balsa; trim 1/16" from top and bottom of the three center ribs to accommodate the center planking. The stabilizer spars are of 3/32" x 1/4" at rib 1 and taper to 3/32" x 1/8" at rib 8. Insert spars through ribs, and space as shown on plan. Then lay this assembly in place on the outline and glue securely. After allowing sufficient time for drying remove the stabilizer from plan and plank as shown with 1/16" sheet balsa. Trim and sand stabilizer smooth to assure an even covering job.

Rudder and sub-rudder are cut from 3/32" medium sheet balsa with grains running vertically. Trim the cross sections symmetrically and sand smooth.

The wing construction is similar to the stabilizer except for dihedral. Leading edge of 1/4" x 3/8" is cut to assure an elliptical curve when glued and pinned on plans. The trailing edge is cut from 3/16" sheet balsa and trimmed down before pinning to plan. Cut wing tip from 3/16" medium sheet balsa and glue into place. The center panel wing spars are 1/8" x 3/8"; the outer panel spars 1/8" x 3/8" at rib 1B, tapered to 1/8" x 1/8" at rib 9. After cutting the required number of ribs from 1/16" sheet balsa, trim 1/16" from the three center ribs to assure a smooth planking finish. Glue wing panels together and allow sufficient time for panels to dry. Now dihedral is put into wing with dihedral braces of hard 3/32" sheet and gussets of 3/16" sheet balsa. For correct dihedral angle follow detail on plan. The leading edge and centersections are planked with 1/16" sheet balsa. To insure an even covering job, trim and sand wing smooth.

COVERING. The wing and tail assembly of the original model were covered with double black Jap tissue paper and given three coats of clear dope. Medium blue was used for striping with white pin stripes to accent it from the black. If Jap tissue is not available, Silkspan is suggested as a substitute.

FLYING. Before flying this model check for proper location of the center of gravity. The balancing point is 75% of wing chord *behind* the leading edge. Test glide model until a long, smooth glide is achieved. For safer power flight adjustments use a 5 second engine run at half throttle. This will gain enough altitude to make adjusting the model an easier task. A 5 second motor run will allow the engine to cut before the model enters a tight circle which may bring it into the ground. When these short flights show evidence of good flying ability, the engine runs can be increased.

The original model is now climbing in a right circle and gliding in a tight left circle. It has flown out of sight three times and completed over 100 flights to date without damage.

Here's hoping that whoever builds the *Eight Ball* will have as much enjoyment and good luck with this game little ship as the writer has had.

Forty-Niner

(*Continued from page 27*)

but leave sufficient material to maintain rigidity. Note also that this wing has a slight dihedral for appearance. While dihedral makes for better and more realistic looks, it probably does not interfere with flyability as many stunt boys would have us think. (Yates, for example, uses slight dihedral.) The finished wing slides through the special slot cut in the fuselage. Attach a guide for the lines, as shown; connect the leads and flying wires and you are off to the races.

For finishing, follow up the final smooth sanding with a coat of clear dope, then a coat of Testor's sanding filler. Use finishing sandaper, or wet-and-dry paper before putting on a coat of paint. Flow on a single coat of colored dope, then sand with the finishing paper and finish with a coat of colored dope that has been cut half-and-half with thinner. If paint is used, put on a coat of fuel proofer which incidentally also gives an appearance of gloss. For best flying, though, just finish the wood with clear dope.

One final note: while we flew with the standard fuel tank, it is suggested that a special tank of whatever capacity you want be made to fit within the fuselage just back of the engine crankcase. The external tank didn't bother our eye but perhaps you will want to conceal the tank and get longer flights as well.

Glider Gadgets

(*Continued from page 33*)

things are different. If the glider is fast and tends to skid outward on a turn, the swept forward wings will tend to right it for the same reason. If the glider is slow and tends to slip inward on a turn, the swept forward wings will tend to spin the glider.

No. 8 is a simple method of hauling small gliders aloft under a gas or CO2 model, and releasing them by means of a timer. The timer pushes a hook out of a loop or crossbar which protrudes from the top of the parasite glider, thus releasing it. The tail of the parasite is held in position by means of a small wire loop which is fastened to the parent model, and which receives either the tail of the parasite or a small wire protruding from it. This rear connection should just barely hold during the ascent, or it may bind when the mechanism releases the parasite and its nose drops. On experimental models, the the top of the parasite glider was sanded to conform to the curve of the fuselage floor of the parent model. This provided a snug fit while the glider was attached, and together with the rear anchor allowed little shifting. A twin tail on the parasite glider was used to clear the fuselage above.

Flash

(*Continued from page 9*)

four-place executive plane. By using such standard items as the wing, landing gear, powerplant, etc. of the *Bonanza* production line, Beech believes they can sell their trainer for about $20,000 each. Now comes Texas Engineering and Manufacturing Co., with their TE-1A, a two seat tandem version of the Temco *Swift*, high performance private plane. Temco has done exactly the same thing as Beech: used standard parts from the *Swift* production line. But Temco believes it can offer the TE-1A for only $12,000, undercutting the Beech by a substantial amount. Although USAF offers the most immediate and largest market,

both companies are eyeing foreign governments for sales. Both prototypes are now flying and being demonstrated to all who care to watch. At the moment, however, the Fairchild Navy XNQ-1 has the inside track for the USAF order, although anything can happen with present procurement officers!

THE STARTLING PROPOSITION of the Canadian Government to manufacutre the record breaking North American F-86A swept-wing jet fighter, and the even more startling approval of the idea by AF has cooled down to a slow simmer now that Pres. Truman's budget indicates AF will have little or no money to spend on aircraft beyond present production. While at first blush it appeared that Canadian interest in the F-86A (as well as the Fairchild C-119 *Packet*) was in a "mutual defense" spirit of hemisphere cooperation, it later turns out that the Canadians hoped to undersell North American and Fairchild by 20-40% in production of these aircraft for sale to the U.S.! The lower Canadian labor and material costs would have made up the difference. Both companies are anxious to help out our northern neighbor in re-arming with late types, but they don't want to set up competition for AF dollars with themselves!

THE HIGH PRICE of Airpower is beginning to hit other countries than our own. Great Britain, no slouch at aircraft design and construction during the war, is facing a serious situation in Bomber Command (BC) which is currently operating the Avro *Lincoln*, a development of the wartime *Lancaster*, as its premier long range bomber. Recently, in a joint Air Force-Navy exercise, the BC *Lincolns* failed to fly their missions, even though Coastal Command managed to "shadow" the approaching fleet for several days. The RAF (and the British taxpayer) was horrified at this failure of highly touted BC to do a job assigned it. As a result England is now asking the U.S. for 250 Boeing B-29's (B-50's if they can get them) to equip BC. England has no money to design and produce a new high performance bomber, although a swept-wing jet bomber is now being built experimentally.

LATEST DOUGLAS AD *Sky Raiders* are multi-seat craft to provide accommodations for special radar operators. The AD-3 and AD-4 will incorporate a radar countermeasure operator in addition to the pilot in one version and two radar aircraft early warning operators in addition to the pilot in another version.

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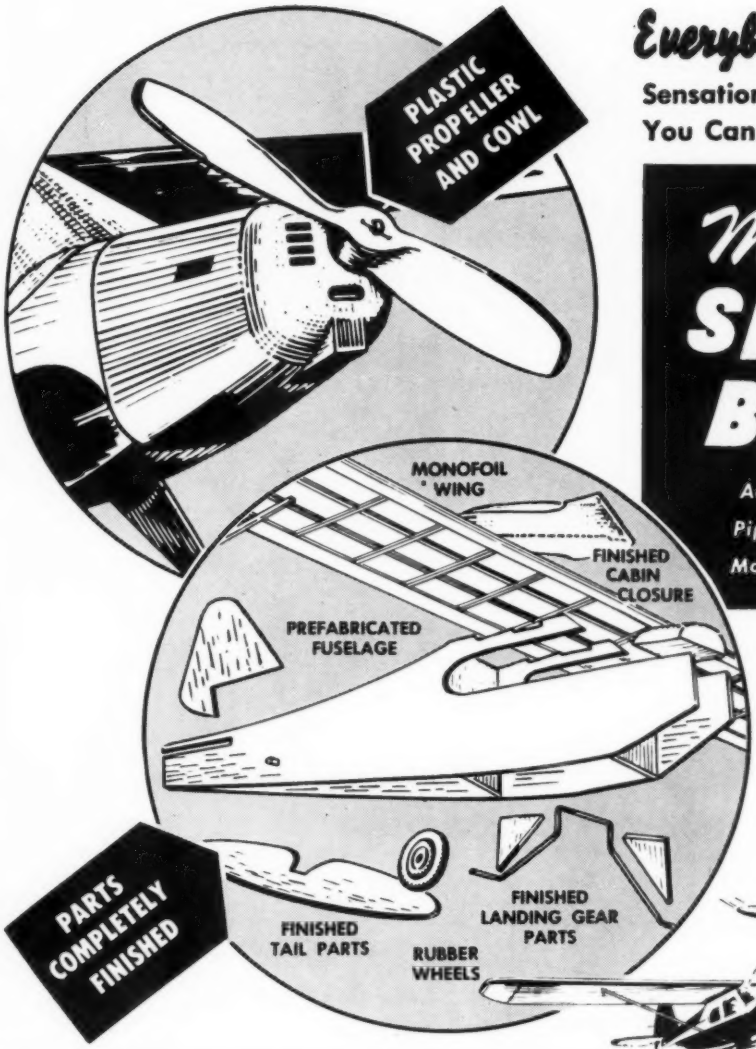

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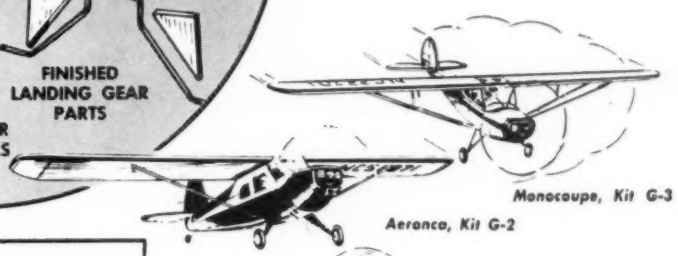
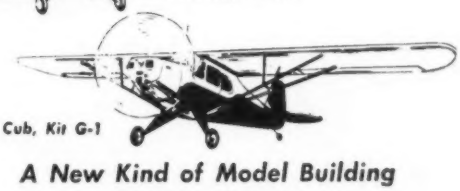


Monocoupe, Kit G-3

Aeronca, Kit G-2



Piper Cub, Kit G-1

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Write a Letter — Win a Prize!

$100.00 in cash and 46 fine Monogram Kits. Prizes given for fifty best letters, beginning — "I like Speedee-Bilt models because —" and finished in twenty-five words or less. You do not have to build a Speedee-Bilt model to enter contest and be eligible for prizes, but letters must be accompanied by Speedee-Bilt box end, bearing Monogram name and address, or reasonable facsimile, and must be mailed before midnight, May 31st, 1949. Duplicate prizes will be given in cases of tie and the decision of the judges will be final. Prizes awarded early in June.

A New Kind of Model Building That's all Fun!

See the picture of SPEEDEE-BILT parts above. Balsa wing has leading and trailing edges, all spars, and top planking built in. **Fuselage** is prefabricated with sides, bulkheads, **cowl block**, molded plastic **cowling** and transparent cabin closure completely finished. **Tail parts** and **landing gear** are completely finished too — nothing to cut out, bend or shape. **Rubber motor** and molded plastic **prop** with something new in metal bearings, eliminating all hooks and wire parts, and **Decal** numbers, can be installed in a few seconds. Get SPEEDEE-BILT KITS at your dealer today. If no dealer near you, add 25c for packing and postage from nearby dealer's stock and mail order to address below.

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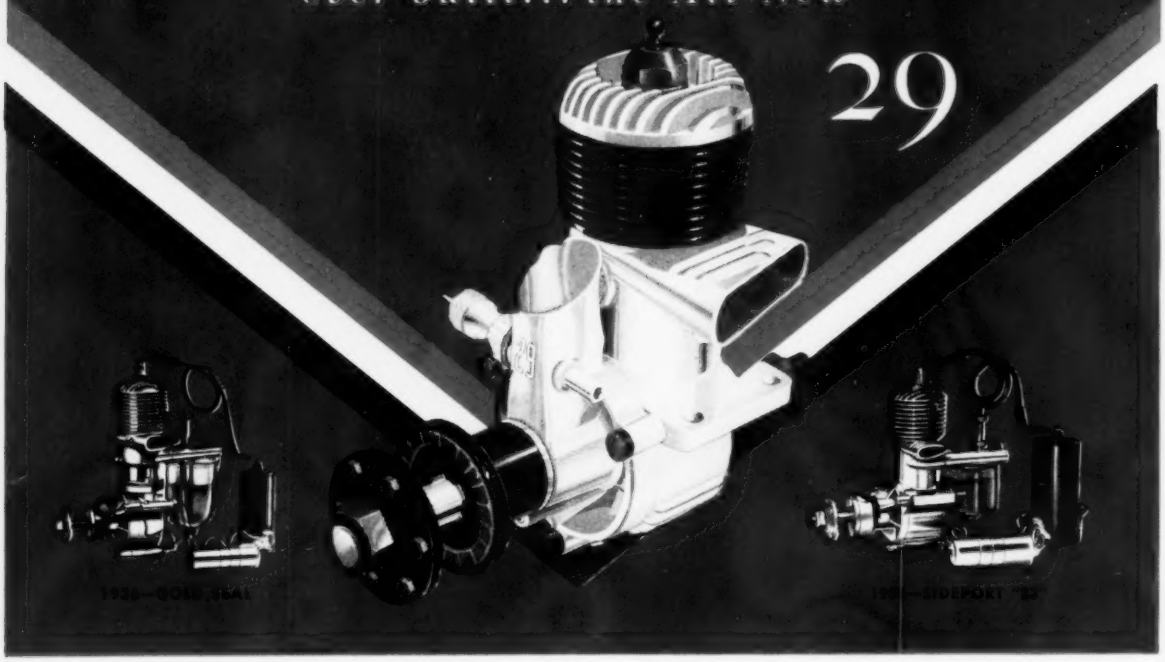
29



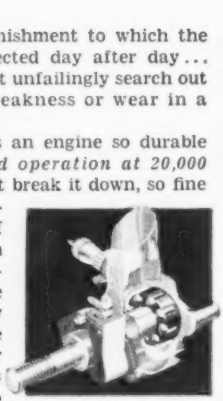
The new "29" brings modelers an engine not only with more power, but also with more *stamina* than any previous model engine of its size.

For the U-Control flyer here is a Class B engine that can *take* it (as well as dish it out). For the free flight enthusiast, here is the famous O & R power-climb, only *more so*, with smoother, more effort-free power. And for the hobbyist who prefers small racing cars and boats, here is an engine that makes these sports truly practical... by providing the stamina for heavy-duty operation.

Long before its announcement to modelers, the "29" proved itself worthy of the name Ohlsson & Rice. Many oldtimers will remember the "Gold Seal" and the original side port "23", engines which also introduced new standards of power and performance.

While these engines received the most severe power and endurance tests used at the time, such tests were child's play compared to the deliberate destructive punishment to which the "29" was subjected day after day... under tests that unfailingly search out any sign of weakness or wear in a model engine.

The result is an engine so durable that *sustained operation at 20,000 r.p.m.* could not break it down, so fine that even inner surfaces of the aluminum parts are polished! Hear the distinctive new war-cry of the "29" at your dealer's. It is the engine to see and own for '49, and many seasons to come.



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